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OF THE ROYAL STATISTICAL SOCIETY

PART I, 1932.

BUSINESS FORECASTING: A QUANTITATIVE INVESTIGATION OF THE INFLUENCE OF MONEY ON TRADE DEVELOPMENT.

By R. G. GLENDAY, M.C., M.A.

[Read before the Royal Statistical Society, November 17th, 1931, the PRESIDENT, SIR J. C. STAMP, G.B.E., LL.D., D.Sc., in the Chair.]

PART I. THE IDEA OF PROGRESS.

(1) *Introduction.*

> "*Life is the art of drawing sufficient conclusions from insufficient premises.*"—SAMUEL BUTLER.

To the business man engaged in planning ahead, forecasting is a necessity. This fundamental fact must be borne in mind by those disposed to criticize the various so-called Economic Barometers which find favour with the business community.

Whether he likes it or not, the business man is compelled to prepare goods ahead of market requirements. Preparations for summer goods must be set in train in the winter, and for winter goods in the summer; even a community's savings must be budgeted for in advance. Estimates of conditions not only three to six months ahead, but in many cases for three, five, or more years ahead, are an essential element in long-range industrial planning. This is a task in which the industrialist looks for the co-operation of the Business Forecaster.

That these individuals may often misjudge the position does not deter the business man from consulting them, provided that on the balance their successes outweigh their failures.

This explains the interest which has been shown, especially since the war, in the publications of the various forecasting organizations.

The expression "Economic Barometers" has been applied to special compilations made for the purpose of indicating tendencies of economic conditions. In most cases they have been constructed by private individuals, though others, such as, for example, that of the London and Cambridge Economic Service of this country, have been in the hands of a body of qualified economists and statisticians. I should like to take this opportunity of paying a tribute to the valuable work done by this latter organization.

A clear and concise summary of the main types of barometers in use will be found in the Report on Economic Barometers issued by the International Labour Office in 1924.

It is not my purpose in the present paper either to give a list of the various systems of this type, or to attempt to criticize their methods. My object rather is to suggest a supplement to their work in order to add to the practical value of Economic Barometers. Their principal characteristic is that they concentrate on what are known as "trade cycle" fluctuations. For this purpose they nearly all of them eliminate secular trend, and, consequently, measurement of the dynamic factors involved in trade growth. This elimination of growth in time has resulted in the major economic fluctuations being treated primarily as disturbances of a condition of static equilibrium, or, to put it in another way, as fluctuations up and down on a more or less stationary base line. Attention has been centred on the pattern of trade, rather than on the forces which have given that pattern significant form.

Changes in the rate of growth of trade, and fluctuations in that rate of growth, on the other hand, express themselves in the speeding up of the rate of flow of goods at one time as compared with another, accompanied by corresponding changes in the money stream which broadens or narrows in conformity with them. One industry or process displaces another; the source of food or raw materials supply moves from one area or country to another; an invention or discovery adds a new "growing point" to the whole; and, finally, one trade area languishes and decays, whilst another emerges, prospers, and forges ahead. These migrations are associated with changes in relative price levels, profit margins, and rates of interest; their influences are associated with longitudinal fluctuations of the base line rather than with the transverse movements round it which are normally charted.

Part II of the present paper describes certain tentative experiments in Business Forecasting along these lines which have yielded results sufficiently promising to encourage the hope that the method will repay critical examination by those with both greater statistical and economic knowledge than I can claim to possess, and, what is almost equally important, the necessary leisure to give the time and thought which such an investigation appears to me to deserve.

Clearly, before embarking upon an examination of the complexities of changes in industrial growth, and its rate of progress, we must start with certain basic assumptions.

The present analysis was begun under the assumption that the theoretical explanation of the relations between changes in the money supply and the movements of trade given in Mr. R. G. Hawtrey's " Currency and Credit " is logically consistent. Unfortunately for my purpose, Mr. Hawtrey has been principally occupied with *static* conditions of equilibrium " tendencies which affect *all* prices equally, or at any rate impartially, at the same time and in the same direction." To adapt his theory to the practical realities of the business world, with its continually changing and moving sequences of relative prices, I have been compelled to superimpose—as it were—on it certain working hypotheses of my own. These are intended to be purely tentative and provisional, and I would have refrained from introducing them into the present paper had it been possible without them to give a coherent description of my material. Money and goods are, I believe, being revealed with ever increasing clarity as two sides of a single economic reality—trade; they cannot be disentangled from each other. Yet we persist in translating them into terms of separate items on different sides of a balance-sheet. We ignore that every time we alter one money item we produce an alteration both in the quantity and in the *kind* of some of the goods produced. Nor is the *time*, the very factor in settling whether these consequential changes will be immediate or separated by a considerable interval, ever taken into account.

(2) *Working Hypothesis.*

I shall begin by assuming, what I believe to be true, that every industrial centre or trade area begins life as a single unit: * development is brought about by a multiplication of this original unit, and by the subsequent interaction and differentiation of the multitude of units so formed. Money acts as the " bloodstream " of this organic development. It not only co-ordinates the activities of the separate parts and distributes products throughout the whole, but, what is of even greater importance, it is used to perform the function of selecting the various special materials needed for growth and development, *e.g.* capital investment, and directing them to the new "growing shoots." If we consider the life-history of any particular trading community over a period of years we shall find that, despite frequent interruptions and accidents, it conforms, like any other living organism, to a general plan or cycle.

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* The adoption of the concept of a commercial community as a co-ordinated organic whole, for the starting-point of our investigations, is fundamental, since the trade of a community, seen from the evolutionary point of view, expresses the maintenance of a co-ordinated whole.

The method of analytical abstraction used in traditional Political Economy, on the other hand, resolves the trade organism into a co-ordinate assemblage of parts, leaving the parts so distinguished with a certain independence which they do not, in fact, possess. From these conceptualized " parts " it is impossible fully to reconstitute the unity from which they have been derived by abstraction.

Some idea of the general framework underlying this plan can be obtained by considering the general principles which a community would have to observe if it desired its progress to be both orderly and continuous. Continuing and orderly progress over a period of years in a community which had reached maturity and possessed a relatively stable population and money supply would appear to demand observance of the following working rules: –

(1) The first rule is that the orderly production and marketing of increasing quantities of new articles in general consumption over a period of years would require that these articles should be marketed either at prices which were gradually falling over the period, or in such a way as to displace in a regular manner existing goods no longer required. Naturally, if prices generally were rising owing to some external monetary cause, this fall would need to be a relative one only. The short explanation of the need for this fall is that, judging from experience in real life, both earning power and efficiency change but slowly over a period, and consequently incomes could only be made to buy more goods if those goods were sold at cheaper prices.

If at any stage of industrial evolution the plan were interfered with by, for example, temporarily increasing the purchasing power of consumers by, say, extending credits to them (cf. instalment finance U.S.A., 1924–1929), the first thing that would happen would be that producers who had been providing for that stage would make larger sales and consequently larger profits than they anticipated. This would bring other producers into the field, and, if their operations were at all extensive, there would come a time when costs would be pushed up *or* output over-expanded till the margin of profit disappeared; the former happening when, as in pre-war days, equipment, raw materials, and intermediate products currently available for these extensions of production would be inadequate. The final result would be over-production coupled with prices which would be unremunerative to both sets of producers and beyond the capacity of consumers to pay, once the current demand had been met and the temporary inflation of their purchasing power ceased. There would accordingly be a "hold-up" (*i.e.* a Trade Cycle Crisis). An important secondary effect would be that preparations in process for marketing goods at still more economical prices over subsequent years—an essential feature of the long-range orderly progress—would be interrupted, and possibly abandoned altogether.

(2) A similar rule would hold in regard to the distribution of the money supply in connection with the establishment of new industries, the exploitation of new inventions, the opening up of new sources of raw materials, or the preparation of new markets. The rule here would be that this distribution also would have to be planned over a period of years in such a manner that the new industries and trade centres, as they came into being, were introduced in such a way as either to displace in a more or less orderly manner existing industries, inventions, and markets, as these become obsolescent, or to enable both the " new " and the " old " to be operated and carried on with progressively decreasing requirements of money " working capital."

(3) *The Division of the National Aggregate of Money " Working Capital."*

In a well-established community each trade or commodity market can be regarded as appropriating to itself its own share of the total supply of money as a sort of " working capital " fund (*i.e.* a fund which is required to carry goods in course of production, manufacture, transport, and marketing, including customary stocks of both raw materials and finished goods, and the payment of workpeople). The same also holds good of member countries in an international trading system. If the money supply is stagnant or increases but slowly, then an increase of " working capital " by one industry or trading area will tend to involve the depletion of another, unless both are content to share and economize the existing supply.

This new demand for " working capital " which arises in connection with certain types of investment is often overlooked. We tend to speak of investment as being synonymous with the construction of " fixed " capital, without differentiating between those types of investment, *e.g.* buildings and machinery, which frequently make a relatively minor—and sometimes transitory—call on Bank credit, and those which create an appreciable and more or less permanent additional demand for money " working capital." In modern industries, where a large range of intermediate products is carried, totalling in money value many times the value of the current output of finished goods, the new demand may be substantial (cf. automobile, radio, and gramophone industries). Fortunately, once formed, this " working capital " operates as a revolving fund which (subject to fluctuations) is used over and over again. Apart, therefore, from increases in population, or lengthening of the chain of production, a demand for new " working capital " arises only when either new industries, commodities, trade centres, or trade routes are being developed.

If at any stage of industrial progress programmes are disturbed by the injection of a supply of new money, *e.g.* a discovery of gold, then more industrial units and sources of supply will tend to be opened up than have been budgeted for at that stage of evolution. Competition for the limited supplies of equipment and materials available will, as under the first rule, drive up prices and consequently the price of credit; a movement which, if continued, will, as in the former instance, culminate in a crisis. (Cf. *pre-war* experience.)

Put shortly, *new* money encourages manufacturers to increase production by opening up a larger *number* of sources of supply and laying down *more* plants of the prevailing type, instead of, according to the original basic rule, by exploiting more efficiently *existing* sources and making more economical use of *existing* plant, equipment and materials. Internationally, *new* money encourages extensive geographical and occupational redistribution of populations.

(4) *Trade Cycle Fluctuations as an Instrument of Progress.*

When monetary conditions are normal it may sometimes be difficult for " new " industries and inventions to obtain their supplies of " working capital " from the " old," since the only " free " supplies available will be those represented by savings and economies. These may be inadequate. Periods of cyclical depression, during which money accumulates in the Banks, are useful in providing an opportunity for " new " industries to filch, as it were, " working capital " from the " old." This applies to men and materials as well as to money, in so far as these can be adapted to the new processes. Unfortunately, this way of obtaining supplies is not without its disadvantages. For, sooner or later, the industries which have been temporarily abstaining from employing their normal quota of " working capital," whether of money or materials, will return to the market and proceed to bid up the prices of what remains. This bidding up will force up the prices of Bank money and such materials as are common to both the " new " and the " old " occupations. If competition continues, the movement may, in the course of time, produce a fresh trade-cycle crisis.

It should be added that the struggle for materials and money need not be confined to entrepreneurs dealing in capital goods, but may extend to those making consumers' goods; for these latter may find that the prices of certain of their raw materials and intermediate products, as well as, of course, the cost of their finance, are being adversely affected by the competition between manufacturers in the two former classes. An extension of credit at such a time, while it temporarily relieves the pressure, will discourage the discarding of old methods and economies in working capital. Quite a modest increase can, under certain circumstances, produce a considerable output of goods from concerns which would otherwise have shut down, and processes which would otherwise have been abandoned. The extension of credit, therefore, by postponing the ultimate conflict between the " new " and the " old," makes the ultimate re-adjustment more difficult and prolonged. (Cf. the effect of the wartime inflation of credit, see p. 32.)

(5) *Money Savings and the Rate of Development.*

If we are dealing with a self-contained community with a limited population, ample natural resources, and a generous allowance of inventive genius, there is no reason why a steady and healthy progression in wealth should not be maintained by obedience to our basic working rules, without any *new* addition to its money supply. The rate of growth, however, would undoubtedly be slow (much slower, for example, than the growth of trade during the nineteenth century). It would, moreover, be in danger of having development brought to a standstill by such circumstances as unlooked-for additions to its working population, exhaustion of natural resources of food and raw material supply, or attempts to absorb new inventions or discoveries at a rate beyond the capacity of its constitution to bear.

To place the issue in sharp relief, let us suppose that a change-over from the flint age to the bronze age were in prospect. The orthodox explanation would tend to concentrate on " savings," and say that the savings previously employed for flint development would have to be diverted to bronze manufacture.

To approach the problem in this way, however, is liable to lead to serious confusion. In the first place, it must be appreciated that the current volume of savings will be small - even in modern times it is doubtful whether our savings consistently exceeded 10 per cent. of our annual income, an amount which, as Mr. F. P. Ramsey has shown, was probably inadequate to the needs of a country which desired to progress at the rate in accord with modern ambitions. Secondly, a relatively small fraction only of those savings would be available for the " new " industry. It is important to remember that investment to a considerable measure proceeds *pari-passu* with —if not ahead of—saving. Even in the case where a highly developed money economy exists, investment tends to take place in anticipation of savings rather than the reverse. A large part of these savings would tend, as now, to be appropriated to buildings, means of transport, and communications (including maintenance and depreciation), much of which would be designed for the use of flint manufacture and flint-mining and ill-adapted to a bronze age. Of the remainder, a substantial proportion would be in "working capital" appropriate to flint manufacture, such as raw flint, partly manufactured flint articles, flint appliances, including stocks both of raw materials and finished implements, none of which would be of the slightest use to bronze manufacturers. A large part of such savings would accordingly have to be wasted. The part of current savings which would be of most value to the newly developed bronze manufacture would be that portion represented by food, clothing, and similar necessaries of life. In other words, the new industry would in the main have to produce its *own* savings.*

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* This latter is a point of major importance. It has been implied by Mr. Keynes and others that the enormous profits secured by entrepreneurs in the major periods of rapid development and progress, under the stimulus of additions to the world's gold and silver supplies, were necessarily derived almost wholly from a divergence of wages and prices.

Professor Hamilton, for example, speaking of the results of the gold and silver discoveries of the sixteenth century, says: "For a period of two hundred years English and French capitalists—and presumably those of other economically advanced countries—must have enjoyed incomes analogous to those American profiteers reaped from a similar divergence between prices and wages from 1916–1919."

This crude generalisation, however, seems to overlook two important factors:—

1. That savings produced in this way might not be represented by the production of the appropriate *kinds* of goods (see above). A misunderstanding of this sort appears to underlie the argument relating to savings in the Addendum I of the Macmillan Report, page 205 (VI), where owing to misconception of the relationship of *money* savings to savings in *goods* no account is taken of the fact that a temporary "hoarding" of the former and a partial wastage of the latter is of the essence of industrial progress. It is this "hoarding" that brings down the rate of interest and the prices of non-specific goods, adjustments essential to a resumption of orderly progress in conformity with the needs of long-range evolution.

2. That the new inventions and discoveries which provided the basis of expansion in the major periods of additions to the world's money supply were immensely more productive than those which they replaced, *i.e.* contributed a large *net addition* to the wealth of the world. This new wealth was able to provide a considerable part of the savings needed for the acceleration in progress without necessarily despoiling existing incomes. While it is certainly true that divergences between wages and prices which occurred must have assisted the process, that this divergence was not necessarily fundamental is supported by the experience of Canada between 1900 and 1913, when, despite an exceptionally rapid advance in prosperity, there was no very marked lag between wages and prices. Nor is adequate allowance made for the circumstance that "new" savings and investment will increase or decrease *concurrently* under the influence of a common monetary stimulus or invention.

Put in the form of an analogy, when a growing tree throws out a new branch, the size and rate of development of that branch do not depend solely on the amount of the parent tree's *pre-existing* resources of food and growing materials. Likewise the materials for war are not provided solely by current savings or a redistribution of titles to current income, but partly by making people work harder and faster, and partly by short-circuiting long-range development plans, thereby releasing—if we include intermediate products—material resources aggregating possibly five to ten times *current* savings, much of which can be used to expand immediate output on the compound interest principle. Also the output yield of a unit of savings can be increased.

If it were vital to the community's continued existence that a change-over should be effected more rapidly than current savings will permit, resort could be had to the hazardous expedient of making an arbitrary addition to the communal money supply in order to enable bronze manufacturers to outbid flint manufacturers for workers and materials common to both processes. The ideal to be aimed at would be to pump in the new money in such quantities as to maintain a continuous pressure to transfer from flint to bronze, without inducing a relief of that pressure by a *general* increase in prices. Such a pressure, incidentally, if it could be steadily maintained over a period of years, would encourage the producers of such other *existing* commodities as food and clothing which would be as much needed in the bronze age as the flint, as well as accelerate provision by the bronze age of its *own* savings and investment.

The process would not be easy to control. If the supply of new money was either continued beyond the point desired, or was injected in uneven doses, it would lead to abuses similar to those which we saw followed the excessive granting of temporary credits under our original rules. Instead of causing a rise in wages and prices just sufficient to induce a transfer from flint to bronze, it would lead to competitive bidding between the two industries, unaccompanied by transfer.

The "pull" required to effect a transfer would vary with the nature of the transfer. It would need, for example, a greater "pull" to induce workers and capital to emigrate from one country to another than to shift them from, say, an agricultural area to a near-by growing industrial centre. But this is not all. If the community into which the new money is injected is one in which there are pent up a number of revolutionary inventions, whose release has been prevented by the inadequacy of savings, the forces operating to compel an over-rapid transfer from a lower to a higher stage of evolution may prove uncontrollable. Moreover, the new methods may be so much more productive than the old that they may produce a hundred-fold or more in profit. These profits will serve both to over-intensify still further the rate of change-over, and to prevent a return to orderly progression once the change-over has been completed. But, however widespread and prolonged those excesses may be, our working rules suggest that *in the long run*, through operation of the forces of competition, orderly growth will resume its sway. Profit margins and prices in the "new" industrial age will gradually decrease, and the process of economizing "working capital" be resumed. The end will be that the members of the community generally will enjoy the benefits of the new invention in the form of either lower prices, a relaxation in the effort needed to maintain a given standard of living, or some new amenity. When this stage is reached, the new money will be found to have come to rest like the old as "working capital," mainly in the industries and occupations for whose creation it was originally responsible.

When we come to consider the actual periods when additions were made to the world's money supply, we shall find that the money was administered in such strong doses and uneven quantities that nearly all the excesses described were experienced.

Business Forecasting depends upon understanding how trade adjusts itself to additions to its money supply.

(6) *New Additions to the World's Money Supply.*

Certain metals, with gold and silver at their head, have for centuries filled the rôle of money.

Gold had been treasured for nearly thirty centuries before it became the material of currency and the standard of exchange. As our speech testifies, gold was the token of uprightness and excellence, the symbol of morality and incorruptibility. No other material can compare with gold in the vastness of its influence in human history.

"Man created an artificial value for gold and then searched the whole world for it."

The search for gold—and in a lesser degree silver—has from the earliest days of antiquity occupied man's attention.

Mr. W. J. Perry, who has plotted on a map the wanderings of the earliest Aryan-speaking invaders, found that every place mentioned in the *Rig Veda* which Sanscrit scholars have been able to identify happens to be a site where gold occurs. In our own time it has attracted vast populations collected from all parts of the world to definite localities in California, Alaska, Australia, and South Africa; in some cases, for instance in California and Australia, the people thus drawn to the neighbourhood of the gold-field have started a new trade centre by settling down to an agricultural life after the harvest of the metal showed signs of dwindling.

The part played by the pursuit of gold in promoting the great maritime adventures in the sixteenth and seventeenth centuries is well known. While the alchemists were busy in their laboratories striving to convert base metals into gold, more enterprising men were roaming the world to discover natural deposits of the metal. The great voyages were essentially treasure hunts.

In recording the world's gold production, it is usual to distinguish three periods. The first dates from the discovery of America to the finds, almost simultaneous, in Australia and California in 1848 9; the second from 1850 until the discoveries of the Transvaal and the invention of the cyanide process of treating gold-bearing ores; and the third from 1890, the year in which these last-mentioned influences began to be felt, until the present day.

First Period. Prior to 1492, the evidence as to the production of the precious metals is exceedingly slight. It is widely held that the first noteworthy change dates from the conquest of Mexico and Peru by Spain (1519–1535), and the opening of the rich silver mines of Potosi in Bolivia (1546). In fifty years these new sources approximately quadrupled the supply, and for some time poured a steady stream into Europe. Silver rather than gold was then the monetary standard. Table I (based on the estimates of Soetbeer) gives a rough idea of the production of gold and silver by ten-year periods from the Discovery of America to 1850.

TABLE I.

Production of Gold and Silver in the World from the Discovery of America to 1850.

(From Soetbeer.)

	Gold.		Silver.	
	Total for Period.		Total for Period.	
	Fine Ounces (millions).	Value in Dollars (millions).	Fine Ounces (millions).	Value in Dollars (millions).
1493–1520	5·22	108	42	55
1521–1544	5·52	114	70	90
1545–1560	4·38	90	160	207
1561–1580	4·40	91	193	249
1581–1600	4·75	98	269	348
1601–1620	5·48	113	272	352
1621–1640	5·34	110	253	327
1641–1660	5·64	117	235	305
1661–1680	5·95	123	217	280
1681–1700	6·92	143	220	284
1701–1720	8·24	170	229	296
1721–1740	12·27	254	277	358
1741–1760	15·82	327	343	443
1761–1780	13·31	275	420	543
1781–1800	11·44	236	565	731
1801–1810	5·72	118	287	372
1811–1820	3·68	76	174	225
1821–1830	4·57	94	148	191
1831–1840	6·52	135	192	248
1841–1850	17·61	364	251	324
Total	152·78	3,158	4,817	6,228

Second Period. This covers from 1850 to 1890. In the first six years of this period production increased by tenfold, and then declined.

TABLE II.

Production of Gold and Silver in the World 1851-1890.

(Figures for 1850 to 1885 from Soetbeer; for 1855 to 1890 from Annual Reports of U.S. Mint.)

	Gold.		Silver.	
	Total for Period		Total for Period.	
	Fine Ounces (millions)	Value in Dollars (millions).	Fine Ounces (millions).	Value in Dollars (millions)
1851–1855	32·0	663	142	184
1856–1860	32·4	670	145	188
1861–1865	29·7	615	177	229
1866–1870	31·4	648	215	278
1871–1875	28·0	578	317	409
1876–1880	27·7	573	394	509
1881–1885	24·0	496	460	595
1886–1890	27·3	564	545	704
Total	232	4,807	2,395	3,096

TABLE III.

Production of Gold and Silver in the World since 1890.

(Estimates of U.S. Mint.)

Calendar Years.	Gold			Silver.	
	Fine Ounces (millions)	Value in Dollars (millions).	Per cent. Rate of Increase.	Fine Ounces (millions)	Commercial Value in Dollars (millions).
1891	6·3	131	+10	137	136
1892	7·1	147	+12	153	133
1893	7·6	157	+7	166	129
1894	8·8	181	+15	165	104
1895	9·6	199	+8	168	110
1896	9·8	202	+2	157	106
1897	11·4	236	+17	160	92
1898	13·9	287	+21	169	99
1899	14·8	307	+7	168	101
1900	12·3	255	−17	174	108
1901	12·6	261	+3	173	104
1902	14·4	297	+14	163	86
1903	15·9	328	+10	168	91
1904	16·8	347	+6	164	95
1905	18·4	380	+10	172	105
1906	19·5	403	+6	165	112
1907	20·0	413	+3	184	122
1908	21·4	442	+7	203	109
1909	22·0	454	+3	210	109
1910	22·0	455	...	222	120
1911	22·4	462	+2	226	122
1912	22·5	466	+1	224	138
1913	22·0	455	−2	...	...
Total	351·5	7,265		3,891	2,431

Third Period. The third period is sometimes dated from the opening of the Transvaal mines in 1884, but as their total output up to 1889 was less than $12,000,000, it is preferable to date it from the invention of the cyanide process, which, in view of its results both in the Transvaal, where it was first applied, and in practically all gold-mining districts of the world, must be regarded as an epoch-making event in the history of gold.

(7) *Influence on World Progress of the Gold and Silver Discoveries of the Sixteenth Century.*

It is seldom realized how recent is the idea of progress. Progress, in the sense of continuous growth, as Professor Bury has pointed out, was quite unknown to the ancient Greeks. Their recorded history contained no impressive series of new discoveries suggesting either an indefinite increase of knowledge or a growing mastery of the forces of nature.

World development, in the modern sense, may be said to date from the gold and silver discoveries of the sixteenth century. From then onwards we begin to find inventions and discoveries, which previously might have taken centuries to spread over the world, exploited sometimes within a single trade cycle. Thousands of years, for example, elapsed between the invention of the first, or Chellean, flint implement with its crude characteristics, and that of the succeeding Acheulean age with its skilfully worked symmetrical tools.

The main railway systems of the world in the nineteenth century, on the other hand, were conceived and laid within less than a hundred years, while the petrol-driven motor-car has probably reached the zenith of its development in less than half that period, and midget golf has completed its life cycle in less than a year. These examples, however, do not necessarily warrant the assumption that this acceleration in the pace of development is to be regarded as a permanent and normal feature of world evolution. It may be nothing more than a passing phase. Our future lives may well be on less lavish and less optimistic lines than the lives we have led hitherto.

The modern world may be said to date from the heavy European imports of Mexican and Peruvian treasures in the sixteenth and seventeenth centuries. These, as Professor Earl Hamilton has shown in a series of illuminating papers, enabled the world to profit by the recently discovered all-water routes to the East Indies and the opening up of extensive markets in the New World: developments which, in turn, stimulated industry and commerce in Europe by bringing a demand for larger-sized vessels, thus encouraging improvements in the instruments and technique of navigation;

while the introduction of new agricultural commodities from America and new agricultural and manufactured goods, especially luxury products, from the East, stimulated general industrial activity to provide the wherewithal to pay for them. It also promoted notable changes in industrial organization, such as the disintegration of the rigid guild organization and its replacement by the more flexible and efficient capitalist employer. In addition, migration to the New World and the East relieved the pressure of population upon the soil of Europe.

The scene opens in the sixteenth century with the vast outpouring of American gold and silver into Europe, where enterprise was being hampered by attempts to expand industry in face of a stationary production of the precious metals. To have endeavoured to increase rapidly the volume of trade by exploiting the markets of the New World and of the East Indies without these additional supplies of precious metals would, as Professor Hamilton testifies, "have had a disastrous effect upon prices, and the progress of capitalism would have been impeded."

Spain was the centre of the influx of new money which, for a period roughly dating from 1520 to 1630, poured into the Motherland at an increasing rate that ultimately exceeded the most fantastic dream of the *Conquistadores*. Thereafter the stream of gold and silver lessened considerably. 'This stream of new treasure, both public and private, in so far as it entered legally, was, with minor exceptions, deposited in the House of Trade at Seville, whence it was ultimately diffused throughout the world. Professor Hamilton recounts how this new gold and silver, after being first employed to promote in Spain the golden age associated with the name of Castile, was gradually driven out by currency depreciation, the decadence of agriculture, industry, and commerce -in general, the illusion that gold and silver would enrich the nation without work.

From Spain part of the new money flowed to the great trading centres of England, France, and Holland, where, as Professor W. R. Scott has recorded for Great Britain in his book entitled "Joint Stock Companies in 1720," the new money helped to lay the foundations of modern capitalism.*

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* Professor W. R. Scott illustrates how the new money helped to lay the foundations of our present-day industrial system by way of the Joint Stock Company. He gives a graphic picture of the striking progress which that system achieved. Starting with the Russia Company and the adventurers of Africa, the only undertakings of this character which are known to have been in existence from 1553 to 1560, we find a total capital of under £10,000, representing only about 0·013 per cent. of what the national wealth may be guessed to have been at that time.

"By 1695 the nominal capital of companies had increased to 1·3 per cent. of the estimated total wealth at that time. Only eight years later it had doubled, while in 1717 it was again doubled, being by that date no less than

My purpose in referring to these researches is that the facts which they have brought to light give a remarkable demonstration on a large scale of the profound influence which an alteration in the money supply can exercise on trade growth.

It is usual to conclude the history of this period at the point where the new money had exerted its maximum effect in *raising* prices. But a complete survey of the influence of new money on industrial progress requires that the matter should be pursued further. This rise in prices may merely be a preliminary to an almost equally rapid fall, whose seeds are sown during the preceding period of rise. Consideration of the problem from the practical side, for example, will suggest that while the new money may for a time cause a rise in prices of *existing* products, its effect on the prices of *new* products must be to induce a fall at a relatively early date. This is confirmed, so far as the sixteenth and seventeenth centuries are concerned, by the investigations of Professor Scott. He reports that the establishment of the English East India Company, at a time when the Dutch were in danger of having an almost absolute monopoly, led to a great reduction in prices of the commodities in which they both traded. Even as early as 1580 there was " overproduction," due to the too great fitting out of privateering expeditions.

Again, the wars between the Joint Stock Companies engaged in developing systems of water supply in this country helped to bring down the cost of the services which they were rendering. Likewise, many examples could be given of competition both from home and foreign sources operating in connection with companies floated at the time to develop inventions and innovations, or introduce new industries. The prices of these new commodities, since for a time they would not necessarily receive adequate recognition in official indices, would tend to be ignored. In time competition and the spread of the new inventions would communicate this fall of prices to *existing* products also.

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20 millions. At the end of 1720, adding the augmented capital of the South Sea Company after the conversion and the sums then called up by the recently established undertakings, the whole amount was about 50 millions, or 13 per cent. of the estimated national wealth at that date. When it is remembered that, of this total of 370 millions, only about one-tenth consisted of instruments of trade—the remainder being lands, cattle, houses and household goods—the full significance of the proportion will be apparent." While many of these companies were engaged in promoting colonizing enterprises in Africa, India, Virginia, New Zealand, and Nova Scotia, others were concerned with domestic developments at home, such as reclaiming land by means of drainage, fishing, and water supply.

The colossal profits secured by these new companies may be presumed to have provided the bulk of the savings for the further development of the enterprises in which they were made, since the other main source of savings, viz. rents, can have played but a minor part, as the period was one of rising agricultural prices with rents lagging considerably behind.

It is, therefore, not surprising to find that, if we exclude the confused period of the Napoleonic era, when wars, suspensions of specie payments, and paper inflations were rife (prices being doubled in twenty years), the succeeding hundred years or so was a period of falling prices, interrupted on three occasions only (if we except the temporary trade cycle fluctuations), viz. at the time of the heavy inflow of Californian and Australian gold in the early 'fifties, in the middle 'nineties, when the South African gold discoveries and the exploitation of the cyanide process brought considerable additional supplies, and, lastly, by the inflation of the Great War. This fall appears to be still proceeding. Nowadays output is more sensitive to money than prices.

To understand more clearly how this new money operated to produce both the original rise and the subsequent fall in prices in accordance with the rules of our working hypothesis, and how this knowledge can be applied to improve existing methods of business forecasting, it is necessary to turn to these latter periods of gold discovery—especially the period 1870 1913 for which more adequate and detailed statistics are available.

PART II. PRACTICAL BUSINESS FORECASTING.

In attempting to use the principles outlined in the foregoing as a basis for practical business forecasting, it must be borne in mind that many of the relevant data required do not exist, and, moreover, such material as has been collected has not been analysed and collated in a form suitable to demonstrate the tendencies to which I have drawn attention.

(1) *World Development during the Nineteenth Century.*

As it is obviously impossible within the scope of a single paper to attempt to apply the above principles to the whole field of industry, even if the data were available, I propose to confine myself to illustrating the manner in which capital development during the nineteenth century was affected by changes in the world's money supply. As this entails reference to trade movements in more than one country, I shall begin by giving a general picture of the fluctuations which occurred in world capital development during the second half of the nineteenth century, under the influence of the additions to the money supply provided by the two major gold discoveries of the period.

In the Appendix will be found a chart (Chart C) of the following items, (1) the output of pig-iron, which I have selected as a rough index of the trend of capital development, coupling with it the curve for unemployment (inverted) which traces the course of the main trade cycle fluctuations of the period; (2) the Sauerbeck index number of prices, subdivided into its constituent groups, to help us partially to isolate the influence of new money on capital investment. The " Mineral " price curve, owing to the specialized character of the principal types of new constructive development over the period, affords some measure of the stresses and strains imposed upon the trade organism by changes in the rate of " new " investment; whilst the independent fluctuations of the other price curves indicate some of the disturbances in the other sections of its life during the period. Curves showing the growth in the British employable population, as well as the fluctuations of the British Bank-rate, complete the picture.

It will be seen that in both periods of new gold inflow in the nineteenth century, the new money, as in the sixteenth century, started with a preliminary boom (so mild in the case of Great Britain in the second period as scarcely to deserve the name). This was succeeded on both occasions (in Europe) by a period of quiescence, followed some fifteen years later by a second boom, complicated in both cases by extensive wars.

The period 1850 is so confused that I do not propose to venture even on a tentative analysis of the meagre data available. I shall confine myself almost entirely to the period subsequent to 1870. Even here it is not easy to disentangle the facts necessary to provide a practical demonstration of the working hypothesis which I have been expounding. Fortunately, however, there is one saving circumstance which does, I believe, enable certain limited and partial indications of the stresses and strains of changes in the rate of progress to be obtained, which can be used as a basis of forecasting. That saving circumstance is that for a considerable part of the period the major developments were linked together into a more or less orderly system which was in a sense subject to centralized control. That control was exercised by Great Britain, who was not only the pioneer in industrial development, but acted as the world's central banker in the sense of mobilizing the world's financial resources and redistributing them through the medium of London. The other financial systems which developed during the period were in the main appendages to that system, and subservient to the policy formulated by the London market. Orders placed by one country for the products of another were easier to execute when placed in or via this country, as the funds required for world trade were centred and maintained in a liquid form in London only. Great Britain was the principal mart for money as well as for goods. British prices accordingly, over the main range of international commodities, can be taken as an index of the resultant of the forces operating.

To illustrate the effect of changes in the money supply on the rate of capital development, an attempt has been made in a chart (see Appendix, Chart A) to give a panoramic picture of the long-term movements of trade over the past sixty years, excluding the war period. For this purpose the development of three leading emigrant countries is set alongside that of the three important borrowing countries. This chart enables one to visualize both the principal trade-cycle movements, as well as certain major long-term changes, such as, for example, the opening up of farm lands and development of railways in the United States in the period 1880–1890, the similar development in the Argentine in the years 1885–1890, and, finally, the transfer of the centre of new investment to Canada in the era 1905–1913.

Trade figures must, of course, be interpreted in the light of the movements which they are known to represent. In the case of a lending country like the United Kingdom, an excess of imports over exports represents in part past payments of interest on sums previously invested abroad. On the other hand, an excess of imports over exports in borrowing countries like Argentine, Canada, and the U.S.A. during the nineteenth century may be largely attributed to loans being received from abroad. Naturally when the loans come to be repaid the excess of imports will be replaced by an excess of exports. I am not, of course, suggesting that the excess of imports due to loans necessarily represents goods from the lending country, for, as we know in the case of Canada, much of her borrowing was expended in the United States which owed large sums of annual interest to Great Britain (though whether in the absence of prior investment in the United States this triangular transaction would have been practicable is open to question, cf. Post-War World). The emigration and immigration figures help to emphasize the trade movements which are known to have accompanied these transfers.

The United Kingdom stands out conspicuously as the principal lending country, while Canada, which was the leading borrowing country in the immediate pre-war decade, as can be seen from her immigration figures, imports, and unfavourable balance of trade, can be taken as a typical borrowing country; between 1900 and 1913 she absorbed some 25 per cent. of Great Britain's foreign loans.

To illustrate this process in operation I propose briefly to refer to certain salient elements in the foreign investment policy of Great Britain during the period, following it up with a sketch of the manner in which that investment policy was responsible for starting a chain of new developments in Canada.

(2) *Great Britain's Foreign Investment Policy:* 1870–1913.

A basic influence behind the gigantic transformation in the surface of the world during the second half of the nineteenth century was the search, by Great Britain and certain other countries, for *continuing* cheap supplies of agricultural produce and raw materials. This task absorbed such a substantial part of her free savings of money and goods,* that at the time of the outbreak of war in 1914 a considerable part of her monetary and commercial activities was devoted to financing the growth, collection, transportation, and distribution of food, textiles, and other raw materials—the produce of the countries which she had assisted to open up. Had the supplies of new gold stopped at the point where Great Britain's food and raw material requirements were met, all might have been well. Unfortunately, each in turn of the new countries opened up for this purpose took advantage of the excess of new money to embark hastily on a voyage to the promised land of industrialization. In every case this ambition, aided both by emigration from Europe and the natural growth of local population, gradually led to the absorption of the local food supply by the local inhabitants, compelling the mother country either to turn elsewhere for new supplies, or to submit to having her growth in prosperity held up and possibly even converted into decline by a rise in her cost of living. The extent to which Great Britain was able to divorce herself from her natural limitation of domestic food supply during the period cannot be better illustrated than by reference to a paper read before this Society by Mr. Hooker in 1909. Speaking of cereals, Mr. Hooker says :—

> "At the beginning of the 'seventies a good English harvest still meant cheapness; ten years later a good English harvest had nothing to do with the price, for by that time the trade had become an international one. For yet another ten years it was found that there were still large areas capable of producing corn supply cheaply, and thanks to the improved facilities of transport, areas from which it could be placed on the market without any difficulty. And so prices continued to fall. By the middle of the 'nineties prices had reached their lowest point; no further areas that could produce corn with equal cheapness were within reach of commerce, or, rather, such new areas were not large enough to affect the total supply or more than satisfy the increasing demand. And so the past ten years have seen relative stability of corn prices; the world's supply and demand are probably not far removed from equilibrium. How long this will continue depends upon the disturbance of the balance. If the development of new areas such as those in Argentina, Western Canada, and elsewhere—proceeds at a greater rate

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* See *The Passing of Free Trade*, by the author, Appendix I.

than the exhaustion of old—such as Europe and the United States—then corn prices will fall; if the reverse be the case, they should rise."

The development of new areas referred to by Mr. Hooker produced its expected result on yields. In the matter of prices, it may be pointed out that in 1908, the latest year which Mr. Hooker had in mind, the index number of wheat, oats, rye, barley, and corn was 137; it declined to 123 in 1910, rose to 146 in 1912, on account of the bad season, but was down again to 123 in 1913. The effect of the increased production on prices would seem to be visible in a reaction from the rapid advance which characterized the movement from 1897 to 1907. As the report of the Canadian Cost of Living Committee of 1915 observes: "It has to be remembered that although the newly opened areas have added greatly to the world's supply, yet as they recede farther from the great consuming centres, the price of the product on the world's markets is influenced by the greater cost of production, transportation, etc." Other considerations than supply are, of course, involved in the price of cereals, such as population, changes in food habits, etc.

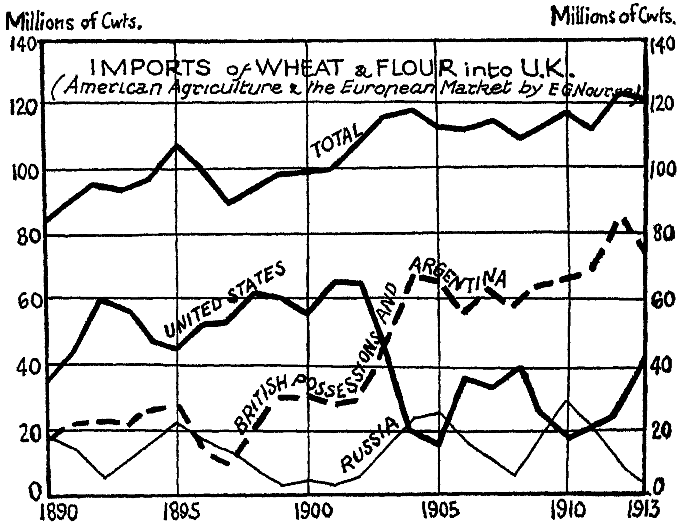

DIAGRAM I.

The change in geographical location of Great Britain's food supply during the latter period can be seen in the above diagram, which shows the change-over which occurred in the source of our wheat imports between 1890 and 1913 from the United States to the Argentine and British possessions.

A similar change-over is shown by the figures for imports of bacon and beef and other important food supplies.

The principal exceptions were cotton and tobacco, which continued at a fairly steady rate of increase during the period, and certain other lines of non-competitive exports such as rice, cottonseed, oil and cake, fresh, canned, and dried fruits.

This change-over in the location of Great Britain's food imports enabled her to escape the effects of the world tendency for food prices to rise until about 1906. It deserves to be mentioned that this rise in food prices which brought difficulties to Great Britain helped to adjust agriculture and industry in the United States, so that by 1914 industry and agriculture in that country were by general consent approximately in a state of equilibrium—an equilibrium, however, which was later destroyed by the Great War.

(3) *The Opening Up of Canada* (1850–1913)

The first opening of Canada as a source of food and raw materials for Europe may be said to date from the Australian and Californian discoveries of gold in the 'fifties, when new gold increased the world's stock by over 30 per cent. between 1848 and 1856. Part of this new gold, stimulated by British foreign investment, flowed to Canada. That development went so far beyond the country's physical capacity that, as Breckenridge in "The Canadian Banking System" reports, a leading cause of the great depression which followed was the "slowness and difficulties of adjustment to new conditions brought about by the introduction of railways, extensions of public works, roads and bridges, shifting of the routes of commerce and alteration of the chief industrial pursuits of important districts. The statement may be made with especial force of Upper Canada, or Canada West, where the real estate excitement had been higher and the increase of railways greater."

Events which followed the resumption of British investment in Canada after 1900 saw an almost exact repetition of development in the earlier period, though the area which provided the economic impulse had naturally shifted.

As is made clear in the report of the Canadian Cost of Living Committee of 1915, to which I am indebted for most of my information relating to this period, the general scheme of economic progress in Canada during the succeeding twelve years hinged on what was popularly known as the "Discovery of the Last Best West," and "in its various manifestations are to be sought perhaps three-fourths of the explanation of the course that has been followed by prices."

The superficial phenomena, like those of the earlier period, were as follows: Under the stimulus of British foreign investment

> "A spirited immigration policy drew thousands of people to the country, primarily to occupy the new lands. An immense railway and townbuilding programme was begun, also for the service of the West. The work of locating settlers, providing lumber for their houses, agricultural machinery for their fields, elevators for their crops, drew the entire economic life of Canada out of its accustomed orbit to a greater or less degree. The East in particular turned to industrialism, the people flocking from the farms to the centres of secondary production and distribution, whither also a considerable portion even of the immigrant tide was diverted. In earlier times, before Western wheat-growing had assumed the lead in Canadian agriculture, the smaller Canadian towns and cities were supplied from the adjacent country. Once, however, the above change took place—and while it was taking place—they were compelled to go further afield for their supplies. New freights and the various other expenses incidental to distribution over a wide area accordingly began to appear as charges in the food bill, at the same time that Canada began to be drawn upon more and more by world markets as a source of supply. Concurrently the familiar features of an intense speculative boom, especially in land, added their demoralising influence. That several other countries, like the United States, Argentina, Brazil, and Australia, witnessed developments similar in kind if not in degree, would account for some intensification of effects locally."

The great rise in prices which took place in Canada during the period was undoubtedly the result of an attempt to transfer from one stage of evolution to another at too rapid a rate.

The relative price movements which occurred in Canada between 1890 and 1913 can be seen from the Charts in the Appendix (Charts D and E).

The general rise in prices between 1900 and 1913, which was approximately 50 per cent., was only equalled by Japan, Hungary, and the United States. In Germany, Russia, India, Australia, and New Zealand the rise was between 25 and 35 per cent.; while in the United Kingdom, France, Holland, Italy, and Norway it was between 15 and 20 per cent. only. Food prices afford an even better measure of this relation between rises in prices and the speed of development than "total" indices, as the former are more directly related to the intensity of local development.

Rents reveal a similar situation, being up 60 to 70 per cent. in Canada, 40 per cent. in Australia, and almost stationary in England.

The speed at which the money supply increased in Canada is evidenced by the fact that between 1900 and 1913 the amount of currency in circulation increased two and a half times, the Canadian gold reserve six times- the most rapid rate of increase in any country in the world. Calculations suggest that the volume of credit instruments increased five times, while the rapidity of circulation of money of all kinds also increased.

The effect on the population is seen in the fact that the labour force increased 45 per cent. in the same period, without allowing fully for the number of new immigrants.

In production, agricultural output rose 36·8 per cent. between 1900 and 1910, mining about 64 per cent. On the manufacturing side, building materials, metal products, and vehicles and vessels for transportation show gains of 200 per cent.

(4) *Forecasting Analysis of Period* 1870–1913.

The period 1870–1913, which I have selected for the purpose of a more detailed illustration of the application of the above information to business forecasting, was one of profound disturbance and economic change. I only need refer to the new and powerful agencies and their growth to gigantic dimensions during the period: namely, the rapid spread of railways to every part of the world; the improvements in navigation and the speed of ships; the quick succession of important discoveries in practical science and the ceaseless activity with which they were applied to increase the efficiency of all mechanical appliances. On the monetary side we have as major incalculable factors the extensive demonetization of silver on the one hand, and the rapid extension and improvement in efficiency of credit instruments * on the other.

In the Appendix will be found a chart (Chart B) plotting the following British curves: Rates of Interest (the rate on "old" investment being represented by consols and that on "new" by reference to the long-term trend of the short-term rate), Mineral Prices, Material Prices, Foreign Investment, Total Exports, Exports of Iron and Steel, and Emigration.

The pre-war chart falls naturally into two parts, the period 1873-1896 and the period 1897–1913.

* So far as the latter item is concerned, there is one saving circumstance. The modern credit system, though apparently largely independent of gold, is linked to it by a sort of planetary organization. Round a central core of gold revolves a first, or inner ring, consisting of Central Bank Credit. This in turn is enclosed by a second ring comprising the credits provided by the Commercial Banks. Lastly, we have a somewhat ill-defined outer ring consisting of a whole range of private credits which, although not officially recognized as such, in effect function as additions to the money supply. Now, while these rings have in a sense independent orbits, which expand and contract in accordance with changes in speed of revolution of trade, they are linked together by a tacit understanding that they are all in the last resort presumed to be *convertible* into gold. But for this circumstance gold could not be taken even as a rough index of changes in the basic money supply.

PERIOD 1873–1896.

(5) *Progress under Inelastic Money Supply.*

The period 1873–1896 was one in which, for a variety of reasons, the supply of money was inelastic. At the same time, as a result partly of earlier investment and major inventions, production went ahead. The fall in prices, estimated at 40 per cent., was described as being "in extent and character without precedent in the world's history." In such circumstances we should expect to find the economic organism adjusting itself by economizing in money; that is to say, economizing in wages, stocks of materials, and other items involving the use of money as "working capital," with the result that the money stream grew longer and became more attenuated.

An individual manufacturer, for example, finding himself faced with a condition of prices falling faster than costs, would endeavour to adjust himself to this situation in three ways. First, he would accept a cutting down in his profit. Secondly, he would cut down his less profitable activities, and especially those not able to yield an *immediate* profit. Equally he would reduce the quantity of stocks and other intermediate products he will hold. Thirdly, he would endeavour to reduce money earnings of labour per unit of output either by cutting wages or increasing labour efficiency. Finally, he might amalgamate with other members in his trade in the hope of reducing the number of times goods are exchanged against money. Inventions also may increase the output yield of money.

In general, growth in production would take place by methods which involve a cutting down of the money working capital per unit of output. This cutting down would mean that profit margins would tend to contract. In the marginal case manufacturers' profit margins would become equated to the rate of interest. This is another way of saying that progress, if pushed beyond the point at which it is possible to displace obsolescent industries, would require a fall in the current rate. This tendency will be reflected in the rate of return on "old" investment (*e.g.* Consols). For if the rate on "old" investment is above that on the "new," people will put their liquid money in it rather than risk it in the new. The movement will, in particular, be registered in investments of the fixed-interest bearing type. Moreover, whenever, as a result, for example, of competition between "new" and "old" enterprises for money working capital, the short-term rate of interest gets pushed up above the long a crisis is inevitable, unless the pressure is relaxed by invention or new money. When a crisis has occurred, new investment will not revive until the short-term rate has again fallen well below the long-term rate. In short, interest rates will move broadly in unison with, and conform to, price movements. These movements of interest rates accordingly provide us with a basis of business forecasting.*

Looking at Chart B, we see that both the long- and short-term rates of interest tended to decline over the period (ignoring Trade Cycle fluctuations), the long-term trend of the latter being below the former. This implies that liquid money unwanted for working capital flowed into "old investment," bringing down the rate of interest, while the fall in profits disinclined borrowers from embarking on new ventures except when the bank loan rate was relatively depressed. Any tendency to take advantage of a period of slump to promote new development, however, produced an early strain in the constricted money stream, and when this strain persisted, brought a trade cycle crisis. These trade cycle fluctuations are reflected by the movements of the "short-term" rate of interest "curve" relatively to the "long." The subsidiary movements in 1876–1878 and 1892–1893, reflecting external cyclical movements principally located in the United States. These several movements are clearly reflected in Chart B. (The Consols curve has been used to show the movements of the rate of interest on "old" investment for lack of a better index; an index comprising a variety of stock of fixed-interest type would doubtless be better.) A crisis was reached at the end of the 'eighties when, possibly owing to the influence of the American railway boom in the earlier part of the decade, which brought a rise in United States food prices, British foreign investment was exceptionally stimulated to seek out new prospective sources of food and raw material supply, notably in Brazil and Argentina.

The effect of this new investment on a constricted money stream was startling (especially as Great Britain was not alone in forcing development). So inadequate did the world's monetary supply prove to be to stand the additional strain, that when the trade cycle crisis came in 1890 the monetary machinery of practically the whole world seized up. The succeeding disaster was so widespread and so many of the countries included had embarked on such extensive schemes of development, for which it was impossible to provide the finance, that many of the countries in question were compelled to abandon transfers to new methods half-way and revert to the more primitive methods. In consequence, even when, as in the middle 'nineties, a supply of new money came forward to make it practicable to provide the "working capital" for continuing the original projects, it was too late.

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* While the question of an ideal monetary policy is outside the scope of this paper, attention may be drawn to the possibility of employing the "dynamic" concept of rates of interest in place of the "static" concept of general price levels, as an index for maintaining stability. This might perhaps suit a mature community not excessively burdened with war debts or other abnormal forms of *past* indebtedness.

PERIOD 1896–1914.

(6) *Progress under Expanding Money Supply.*

The next eighteen years, 1896–1914, witnessed a remarkable change in the situation. The discovery of new gold in the Transvaal, coupled with the invention of the cyanide process of gold extraction, brought a plethora of new gold. The pressure towards economy of the preceding period was replaced by an urge to expand. The money stream could be broadened and the chain of production shortened. Similarly, profit margins tended to widen and entrepreneurs were encouraged to launch out into development schemes, since development was no longer linked to displacement. As the "new" and the "old" could now expand side by side, rates of interest also rose, the rise continuing until either the requisite quota of "new" goods was forthcoming, or the money supply gave out (*i.e.* money became too dear). The immediate extent of these changes, according to our hypothesis, would depend upon (*a*) the speed at which the new money was injected, (*b*) the quality and number of new discoveries and inventions awaiting exploitation.

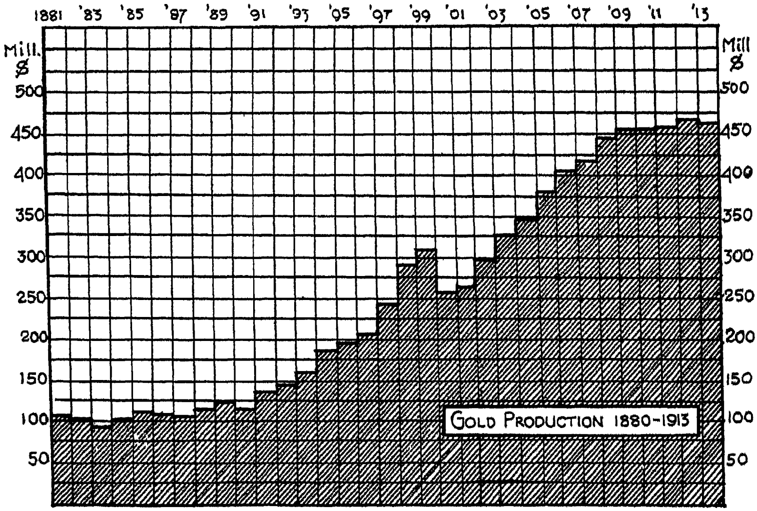

DIAGRAM II.

(*See* "Destination of new gold", Appendix I.)

The above diagram gives a pictorial representation of the additions to the world's gold production.

In Great Britain the inflow was so gradual that it took some two years for the new money to begin to exert any perceptible direct influence either on the rate of flow of the domestic money stream or on the return on investment, and there were no outstanding inventions calling for finance (the bicycle was the important contribution). The rise, moreover, when it did come, if we exclude the general recovery of prices between 1896 and 1900, which probably did not represent much more than a relaxation of the previous pressure to contract, was mainly concentrated on "mineral prices" and domestic investment. "Mineral prices," which during the preceding twenty years had tended (except in periods of temporary boom) to keep down to, if not below, the level of other prices, suddenly rose nearly 70 per cent. in four years, as compared with a rise in other prices of only 16 per cent. This rise was associated with a domestic building boom and special demands on account of the South African War. When the war demand slowed down and the boom ended, mineral prices fell back. But as there had been no appreciable investment of the type calling for permanent new "money working capital," there was no serious crisis in 1900. "It was no more than the fading of the bright prospects of 1899 into the dull outlook of 1901." Not until about 1903 did the rise in prices in new countries overseas lead to the resumption of international investment on the lines which had been abandoned in 1890.

Special note should be taken of the fact that the curve for investment moves *ahead* of the flow of exports. Despite the circumstance that the curve for investment in Chart B has been moved forward six months to allow for the time between raising a loan and its ultimate expenditure, the lag between it and the curve for exports is nearly a year.

Attention is drawn to this circumstance because it is so frequently asserted that a favourable trade balance should *precede* foreign lending, a statement which appears to be true only when the loan is as it were *forced out* of the borrowing country (cf. Reparations), and not, as was generally the case with Great Britain during the greater part of the nineteenth century, when the investment was as it were *sucked* out of her by the favourable conditions in the borrowing country with whose development her finances were closely linked.

This era of overseas investment continued until the outbreak of hostilities in the Balkans in 1912–1913. For this period of rising prices also, the relative movements of the two rates of interest curves provide the key for business forecasting purposes. The long-term trend of the short-term rate of interest curve tended to be above that of the long-term rate of interest, indicating that the pressure to contract the money needs had been replaced by a tendency to expand investment was dragging at savings. This circumstance had a considerable effect on the character of the trade cycle movements. These were now associated with a much freer movement of men and materials and with sharper mineral price movements (*i.e.* capital goods).

It will be noted that after the preliminary rise of 1896-1900 prices, "excluding" minerals did not begin seriously to feel the effect of the new money until about 1909 and onwards, when the upward turn of all the curves on the chart (especially those recording values in relation to those recording volume) suggests that a condition of real "inflation" (*i.e.* rises in price without transfer) was under way—a condition which, as we have seen in the case of Canada, had already made considerable headway in certain of the newer countries overseas.

(7) *Statistical Note on Forecasting Chart.*

The somewhat striking conformity in movement exhibited by many of the curves in the charts has suggested the existence of significant correlations. The following preliminary results have been obtained.

The remarkably close correlation between the movements of prices and rates of interest, which has long been known, is in accord with the working hypothesis outlined in the first part of the present paper, and if that hypothesis is correct, should become more marked the longer the period charted.

Mr. A. H. Gibson has shown that the prices of commodities and the yield of consols during the period 1820–1926 moved up and down together; the closeness of this sympathetic movement, as measured by Dr. W. H. Coates for the period 1825–1924 giving a correlation coefficient of +0·893, showing not far from perfect synchronization of movement over a 100-year period.

Great Britain's unique position as the principal free market both for money and goods has encouraged me to take the analysis a stage further and attempt to relate in a similar manner fluctuations in capital development to price movements. For this purpose I have taken the movements of the curve of prices "excluding" minerals as representing goods of industries likely to feel the drag of transfer from "old" to "new," and have compared them with the movements of the consols curve which would be subject to the corresponding impulses in the money stream. Mr. A. L. Please, who has kindly worked out the mathematical correlations, finds as high a degree of correlation as + 0·82 over the period 1870–1913.* That this is not merely a part of the earlier correlation receives support from the fact that if the period is split up into the three parts, corresponding to the three known changes in phase of the monetary supply, *i.e.* 1870–1884, 1885–1899, and 1900–1913, highly significant degrees of correlation are still obtained. The coefficient of correlation for 1870–1884 was + 0·91; for 1885–1899 + 0·88, and for 1900–1913 + 0·82.

Moreover, we are able to approach the movements from the other end by taking "mineral" prices, which would both feel the main pressure of the development of "new" industries as well as the cyclical fluctuations in that development, and correlating them with the short-term rate of interest curve, which should reflect the corresponding changes in the flow of money. The correlation in this case is found to be 0·79.

The possibility of an even more detailed subdivision of the flow of capital investment is suggested by the existence of a correlation of 0·78, found to exist between British iron and steel exports and foreign investment.

Apart from these correlations the curves suggest that deviations from stability in long-term evolution are associated with movements up or down in *both* the long-term and short-term interest curves, intermediate or "trade-cycle" fluctuations with *relative* movements of the two curves.

It will be observed that on every occasion of a trade cycle fluctuation, a premonitory warning was given by a marked rise in the short-term rate curve relatively to the long; whether this should be regarded as due merely to some temporary extraneous disturbance, or was, in fact, an approaching culmination, is made clear by movements of the other curves.

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* *Co-efficients of Correlation for Indices used in Chart "B."*

Indices.	Period.	Coefficient.
Wholesale Prices (excl. minerals). Yield on Consols	1870–1913	+ 0·82
Mineral Prices. Short-term Rate	1871–1913	+ 0·79
Foreign Investment. Iron and Steel Exports ...	1874–1913	+ 0·78
Total Investment. Short-Term Rate	1871–1913	+0·42
Total Investment. Mineral Prices	1871–1913	+0·39
Mineral Prices. Yield on Consols	1871–1913	+0·58
Wholesale Prices (excl. minerals). Short-term Rate ...	1871–1913	+0·43
Emigration. Iron and Steel Exports	1881–1913	+0·67
Emigration. Foreign Investment	1881–1913	+0·57

PART III. THE POST-WAR WORLD.

(1) *Transition from Pre-War.*

The war marked the close of an industrial era so remarkable that it seems unlikely that it can ever be repeated. It witnessed the development and extension to nearly every quarter of the globe of those epoch-making inventions in transport, communications, and power—the steamship and railway, the telegraphic cable, and the commercial utilization of coal for power production. Under the stimulus of gold discoveries, these inventions had been applied to the constructive opening-up of the agricultural resources and raw material supplies of the principal virgin areas of the globe at an extraordinarily rapid speed.

Even before the war it was becoming obvious that such a policy could not be continued for more than a limited period. The field of exploration was slowly contracting. The virgin areas situated in proximity to the seaboard had, in the main, been opened up, and the outposts of the commercial army were gradually being compelled to seek for new regions to conquer in the hinterlands of continents, where the rate of penetration was slow and lines of communication were unduly extended and became increasingly expensive to maintain.

Secondly, while it was true that there were still many areas of the world which did not enjoy the benefits of these inventions, and much remained to be done to improve their technical application, including their replacement by more efficient substitutes, it was not to be anticipated that within the comparatively near future there would be new inventions as revolutionary in their effect on industrial development as these were when first introduced.

It is seldom realized how many of the major inventions which have succeeded them have been in effect little more than alternatives for providing and extending these same primary services. The Atlantic liner, the motor-car, the aeroplane, wireless, oil, water power, and various applications of electricity are in this sense substitutes for, or additions to, the earlier equipment of the steamship, the railway, the telegraphic cable, and coal. This helped to create a condition likely to be highly sensitive to any slowing down in the rate of world expansion or growth of population.

Thirdly, there were increasing signs that the industrialization of the newer countries overseas would begin shortly both to restrict the demand for the products of the old and, by increasing competition, encourage economy in methods of manufacture generally, despite an ample money supply. This tendency to economize money was also being encouraged by growing competition between the various alternative processes of providing the same services and commodities which under the pressure of the excess of money had all been tending towards over-expansion. Fourthly, the surfeit of money had, as can be seen from the rise in prices in food and raw materials which occurred, been forcing the transfer from agriculture to industry in the newer countries at too rapid a rate.

In short, the geographical and occupational redistribution promoted by the new gold was ceasing to bring advantage; while progress continued to be urged on at a faster rate than invention and discovery demanded.

It is important to keep in mind this picture of conditions immediately before the war, as it helps to explain the transformation which that conflict effected.

(2) *The Effect of the War.*

War—like the currency depreciation with which it is so frequently associated—redistributes productive forces from their normal channels of evolution, where their accumulations of savings are put to what may be called the constructive purpose of ministering to the future growing needs of the trade organism, and concentrates them on providing the means of immediate destruction. Instead of employing savings in making provision for future industries or markets, it diverts them to developments most of which will probably cease to have value once the war is at an end. Moreover, to meet the urgent needs of war it demands the opening up of uneconomic sources of supply and compels countries (*e.g.* neutrals) cut off from their normal supplies to duplicate requirements.

In addition, it stimulates methods of production inappropriate to the humdrum level of peace-time progress.

The Great War is largely responsible for providing the world with that dangerous implement, the modern mass-production technique, breaking the link between price index and money.

The superimposition of these war-time developments on the over-industrialization of the immediate pre-war years meant that the potentialities of the world for over-production, once the war was over, were stupendous. This condition supervened at a time when the populations of the principal industrial countries were losing their earlier mobility and elasticity of growth.

Lastly, the supply of new gold was due to fall off. While the effect of this was not immediate, by 1930 we find the gold delegation of the Financial Committee of the League of Nations reporting as follows: "The evidence points, in our opinion, conclusively to the prospect of a serious situation arising as soon as or shortly after business activity revives, unless steps to alleviate it are taken in time. Moreover, unless new and unexpected sources of supply are discovered, the decline in the output of gold is likely to continue at an accelerated rate after 1940, as the South African Mines, which account for over 50 per cent. of present annual production, become gradually exhausted."

It must be remembered that the over-expansion on the industrial side had also been communicated to various departments of agriculture as a result of the stimulus of increased war demands for food. The possibility of a condition approximating to *general* over-production is often denied; but this static view ignores the dynamic element in industrial progress. One of the organic principles of the orderly evolution of trade is the continual replacement of one method of providing a commodity by another.

If, for a period, this replacement is interrupted by an expansion of money, so that both the new and the obsolescent processes are encouraged to continue to grow side by side, then some contraction of one or both is inevitable when orderly growth is resumed. The same rule holds in regard to the opening-up of sources of supply belonging to different stages of evolution, as well as to the expansion of alternative methods of providing similar services. Once inflation ceases, competition for the reduced market between goods produced by different methods may be so widespread as to deserve the name *general* over-production. Production also may be wrongly *timed.*

For example, general over-production may be fostered by laying plans for the future on the assumption that the current rate of growth will be maintained. A common assumption at the present time, for example—for which there appears to be no firm warrant—is that we are entitled to base our estimates of the world's future requirements of certain commodities, including gold, on the knowledge that during a large part of the nineteenth century an expansion of output at the rate of about 3 per cent. per annum was assimilated.

(3) *The Post-War Period.*

The fundamental problem of the post-war world was to remarry the flow of money and the flow of goods and to produce a new healthy offspring of orderly international development. The present world crisis is a measure of the failure to bring about that remarriage.

As it would be impossible within the limited scope of such a paper as this to venture even upon a *résumé* of the history of both "goods" and "money" in the intervening period, I shall deal with the latter only, as I have more data. 1924 saw the first steps taken to relink world currencies to gold, and the beginning of the expansion of the world trade after the slump which followed the collapse of the reconstruction boom of 1919–1920. These steps exercised a decisive influence on the course of future events, for in this period it was the redistribution of the *total* supply of gold, rather than the additions to it, which controlled the creation of currency and credit. (See Appendix III.)

While I am anxious to avoid matters of controversy, it will shorten explanation if I say that I am in agreement with the views officially expressed by industry in 1924, when a return by Great Britain to the gold standard was under contemplation, viz. that such a return could only be made with safety "if it is preceded by some agreement with the American Central Banking authorities for regulating the value of gold until such a time as it again comes into general use." The world balance of industries needed to be first adjusted and complementary relations re-established.

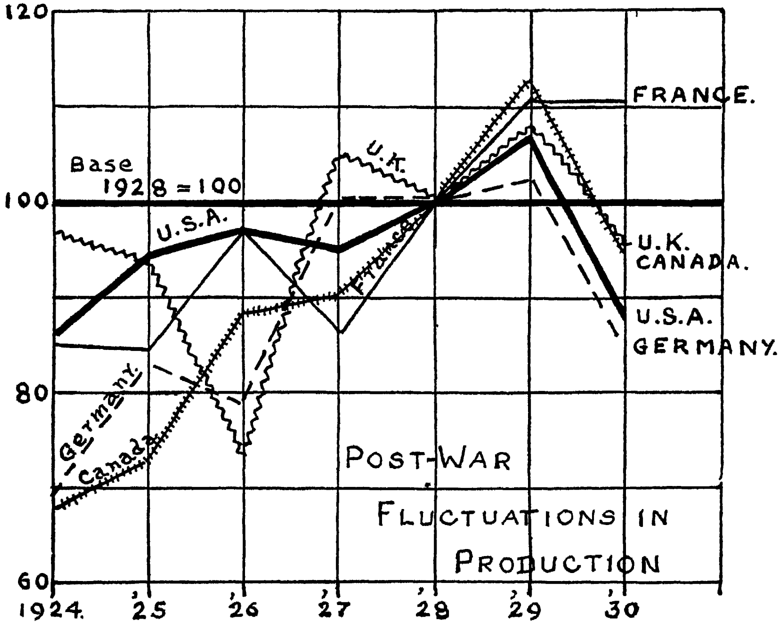


DIAGRAM III.

From the outbreak of war the international gold standard and its dependent machinery had ceased to function in the pre-war manner. Instead of the more or less unified system of international inter-trading and directed investment, the world had split up into a series of more or less independent trading units. Post-war reconstruction was a problem of re-apportioning "working capital" in a new guise. Great Britain, in order to redistribute her activities in accordance with peace-time needs, required an expansion rather than a restriction of credit. The United States, with her limited international activities, could have done with far less gold than she had acquired as a consequence of the fortunes of war. Germany was so desperately short of money working capital that revival was impossible without external aid; while France, once reconstruction was achieved and her currency stabilized, had ample for her current needs if she repatriated a reasonable amount of her foreign balances.

The situation was complicated by the superimposition of a chain of international debts which, while too large to be met in gold, could not be paid for in goods or services, since there were no direct or indirect complementary trading relations between the debtor and creditor countries (*i.e.* the payments were not the result of earlier "complementary" investment of the pre-war British type); so that tariffs opposed the entry of the only goods in which they could be paid.

The *impasse* thus created was temporarily overcome by the United States lending a title to gold to Germany to act as a basis for her "working capital" need; this title she in part passed on to France in payment of her reparation obligations, while France, since she did not need the money at home, redeposited it in the United States; Great Britain participated in all these operations, but was on balance largely unaffected so long as they all "played the game"; which they did till about 1929.

The history of the six years from 1924 onwards is well known. A persistent attempt by Great Britain to secure a permanent increase in her gold reserve; a policy of "splendid isolation" by the United States; a struggle to restore her industries and rehabilitate her finance by Germany; and a concentration on domestic reconstruction in France. Interference with these activities came from such factors as inter-allied debts, reparations, and tariffs, and, overshadowing them all, the problem of unbalanced world production.

Great Britain's main domestic problem was to increase her gold reserves, her success or failure being in the main dependent on events in the United States. America's problem was in one sense more complex. She could either attempt to take Great Britain's place as a promoter of future development in "new" countries, act as a moneylender by assisting in the recovery of distressed "old" countries, or devote her excess funds to a new type of development, such as, for example, the application of war-time processes to the development of "secondary" industries. She, to some extent, attempted all three, though the third was her major preoccupation. Its success depended upon two presumptions: (1) Her ability to expand *more or less continuously* the individual buying-power of her domestic consumers, and (2) the assurance that the fall in primary products, which had occurred between the years 1920 and 1922, had cleared away most of the excess capacity, so that the price recovery which followed could be safely regarded as a permanent—not merely temporary—interruption in a long period fall: in other words, that the pre-war rules could be applied unchanged. She was doomed to be disappointed in all these assumptions.

With her return to gold, Great Britain's monetary flow came under the influence of changes in American monetary policy. The interaction of the monetary policies of the two countries, coupled with the movements of British rates of interest, accordingly provided the basis for business forecasting. As there were no outstanding inventions during the period, nor important elements of external " constructive " capital investment, the only other features which required watching were the world expansion of certain " secondary " industries and the progress of state-promoted development schemes at home.

Having regard to certain innovations in Central Banking methods, movements of the Bank Rate did not alone afford an index of forthcoming exchanges in the money flow. They needed to be supplemented by a more detailed study of banking procedure. If we examine the post-war curves in Chart B, it will be seen that, as in the period 1870–1896, the trend of the short-term rate of interest curve was below that of the long from 1921 to 1929. Although there was a slight rise in the curve for gold and notes from 1922 onwards, accompanied by a similar modest increase in deposits, the period as a whole was one in which the supply of money in relation to demand was inelastic, especially as industry had not yet been able to adapt itself to the deflation of 1920–1921. Industrial growth was accordingly forced to proceed along lines similar to those of the period 1873–1896, when progress depended on the ability to economize money and lengthen its stream.

The position in America was quite the reverse, for from 1923 onwards there had been a considerable expansion of credit. This is shown, in the first place, by the trend of the short-term rate of interest being above that of the long for most of the period (see W. W. Riefler's *Money Rates and Money Markets in the United States*).

Her gold supply was no guide to the situation, as from 1923 onwards the Federal Reserve Banks had publicly abandoned the statutory principle of " reserve proportions," adopting in its place as guiding principle the " stabilization of prices ". This policy, as it encouraged uncontrollable inflation, eventually brought disaster.

The following figures, giving the deposits of the member Banks of the Federal Reserve system, make the position clear.

	Time Deposits in Dollars (millions).	Demand Deposits in Dollars (millions).
30th June, 1922	7,175	14,252
29th December, 1922	7,645	14,816
3rd April, 1923	8,143	14,526
30th June, 1923	8,378	14,693
14th September, 1923	8,466	14,566
31st December, 1923	8,651	15,164
31st March, 1924	8,890	14,719
30th June, 1924	9,204	15,309
10th October, 1924	9,597	15,703
31st December, 1924	9,805	16,684
6th April, 1925	10,127	15,854
30th June, 1925	10,382	16,812
28th September, 1925	10,467	16,618
31st December, 1925	10,653	17,825
12th April, 1926	10,955	16,823
20th June, 1926	11,173	17,380
31st July, 1926	11,440	17,639
23rd February, 1927	11,818	16,831
30th June, 1927	12,210	17,735
10th October, 1927	12,459	17,374
31st December, 1927	12,765	18,170
28th February, 1928	12,923	17,305
30th June, 1928	13,439	17,607
3rd October, 1928	13,410	17,501
31st December, 1928	13,453	17,904
27th March, 1929	13,329	17,708
29th June, 1929	13,325	17,815
4th October, 1929	13,318	17,937

(See Appendix III, written evidence of the Federation of British Industries to the Macmillan Report.)

It will be seen that the main growth in time and demand deposits took place in the first rather than the second half of the period, the growth during the last three years being quite moderate.

As the matter is of some importance to the elucidation of subsequent events, it should be stated that the impression conveyed by this table, that the serious internal inflation of bank credit belongs to the first period, is supported by the fact that, as shown by the downward trend of United States prices and the favourable exchange, the velocity of circulation did not increase markedly during that period.

Further confirmation is provided by an analysis of brokers' loans, which were the principal source of the funds used in Stock Exchange speculation. As the following table shows, though there was some increase in loans "by Banks" between the autumn of 1927 and early 1928, the period when the Federal Reserve Authorities temporarily adopted a policy of cheapening money with a view to helping Europe, during the remainder of the period they altered but little. The startling increase during 1928–1929 came from loans "by others"—that is to say, from Non-Federal Banking sources. Loans "by others" represented in the main the surplus earnings of various concerns, including industrial undertakings. From the middle of 1928 onwards the figures are swollen by the foreign funds which flowed in from abroad to participate in the boom.

	Brokers' Loans in Dollars (millions).		
	By Banks.	By Others.	Total.
January 1926	2,540	585	3,125
July 1926	1,960	646	2,606
January 1927	2,037	741	2,778
July 1927	2,220	877	3,097
January 1928	2,812	990	3,802
July 1928	2,472	1,760	4,232
January 1929	2,974	2,434	5,193
July 1929	2,849	2,992	5,841
October 1929	2,896	3,602	6,498

This surplus of money, as in the periods when the excess was based on gold, moved for a number of years through various hands before it began to come finally to rest in industrial "working capital" in 1929.

The position from 1926 to 1928 was in many respects strikingly similar to that which ruled in the earlier periods when a similar condition of concealed monetary inflation existed. The inflation in this instance, however, did not affect ordinary commodity prices, for three reasons. First, as a result of the war, capital goods (*e.g.* "minerals"), the prices of which used to give early warning of inflation, were in excess supply. Secondly, there are many directions in which inflation can occur without directly affecting commodity prices included in published indices; notably in Public Utility "Services," which are quasi-monopolistic in character and outside the reach of foreign competition. America's capital development in recent years has been largely in public utilities connected with the supply of water, gas, electricity, and communications, items which are not represented in the ordinary commodity price indices. Thirdly, the inflation in the "secondary" industries, where much of it occurred, would not be reflected so much in the *prices* of the goods they sold as in the *quantities* of the goods which they put on the market, in relation to the demand.

(4) *Forecasting Analysis of Monetary Events in the United States and the United Kingdom during* 1924–1929.

The following analysis, which is summarized from the records of the Federation of British Industries Business Barometer, shows the application of the inter-relation of the United States and British monetary policies to business forecasting (further details can be found in the issues of the Barometer itself and in Appendix III of the Federation's written Evidence to the Macmillan Committee).

1924–1926. The middle of 1924 found the United States passing through a period of trade depression. To understand how this came about it must be recalled that in the period following 1920–1921 the Federal Reserve Banks openly abandoned the statutory principle of "reserve proportions" (*i.e.* basing their credit policy on the size of their gold reserves), and substituted in its place a policy of attempting to *stabilize* trade and prices. In pursuance of that policy, American business had been assisted to emerge from the post-war depression of 1921 by a deliberate expansion of credit by all the Federal Reserve Banks. As by the beginning of 1923 prices had risen substantially and the *expansion* of credit showed signs of getting out of hand, steps were taken to *contract* credit. The rediscount rate was raised to 4½ per cent. in February, and the Federal Reserve Banks' holding of "open market assets" was reduced. Prices fell, production declined, and unemployment increased.

By the middle of 1924 the Federal Reserve Banks had come to the conclusion that this *contraction* of credit had, in its turn, gone too far; the price index having fallen by June to 144·6, or 9 per cent. below the level at which it had stood in March, 1923. The New York rediscount rate was successively reduced in May and June, and finally in August to 3 per cent., the Banks' holdings of securities being in the meantime increased. This reversal of policy started a revival of trade in the United States. Unfortunately the upward movement in American trade and prices happened to coincide with the decision of the Bank of England to take the initial steps towards strengthening our exchange position with a view to the return to the gold standard in the following year.

The choice before the Bank of England lay between encouraging British trade and the absorption of the unemployed into industry by allowing British credit to expand *pari-passu* with that in America —neglecting the position of our exchange with America—and adopting a policy of credit restriction, and so preventing a rise in the British level in order to improve our exchange.

In July, 1924, the decision was taken to restrict credit. The Bank Rate, which had stood at 4 per cent. for nearly a year, though it had been largely inoperative, was made *effective*. This step, coupled with speculative anticipation of our return to the gold standard, raised the exchange, which had fallen at one time to nearly 4·20, to 4·78 by January. Early in 1925 a more drastic policy of credit restriction was put into force. Following a rise of ½ per cent. to 3½ per cent. in the New York Federal Reserve rate (to check the outflow of gold to Europe and the incipient internal inflation), the British Bank Rate was pushed up to 5 per cent. in March, 1925. Subsequently it was, somewhat surprisingly, temporarily brought down to 4½ per cent. in August and 4 per cent. on the 1st of October, at a time when gold was flowing abroad. In forecasting at that time it was suggested that these reductions implied "miscalculation." In any event, the rate was brought back to 5 per cent. in December.

The unemployment situation, which had ceased to improve since June, 1924, steadily became worse, and prices fell. The price level, according to the Board of Trade Index number, had fallen from 171 in January, 1925, to 143·6 in April, 1926. It reached 140·6 in March, 1927, after the coal dispute. Had that fall been confined to this country, there is little doubt that the adjustment of British market prices, which was the objective, would have been achieved, though, of course, a considerable time would undoubtedly have elapsed before the elements entering into British domestic costs of production would have been adjusted to the new price level, *e.g.* wages and the cost of living, transport charges, taxation, etc.

Unfortunately, the effect of this credit restriction was not confined to British prices, but was world-wide. American prices were not excepted. The result was that a greater part of the fall in British prices was counteracted by a fall in the American price level. The American index fell from 149 in March, 1925, to 134 in April, 1927. In other words, while the value of the £ sterling was forced up, the objective aimed at was receding. New York might be the largest market for both money and commodities, but London was the dominating *international* influence.

1926–1929. The history of this period is complicated by the fact that both the Federal Reserve Board's attempt to stabilize American industry and prices and the Bank of England's endeavours to strengthen her gold reserves, were subject to disturbance and extraneous interference by events arising in connection with the rehabilitation of the currencies of such important countries as

France, Italy, Belgium, and Germany, with a view to their being relinked with gold. In particular, the steps taken by France and Germany during the period 1928–1929 to increase their gold reserves introduced a sufficient element of competition in international monetary affairs to justify the description a "scramble for gold." But through all these interruptions, I believe, it is still possible to trace the mutual reactions of American and British monetary policies.

British policy during 1926 and early 1927 was principally determined by the coal stoppage and its after-effects; the Bank Rate remaining at 5 per cent. throughout. Developments in the United States were conditioned by the fact that, although the fall in the British commodity price level had been communicated to American prices, the supply of money was so plentiful in the American home market that any slowing up of trade due to the fall in commodity prices was masked by expansion in other directions. This was the period of the Florida land boom and the rapid expansion of the hire-purchase system; indeed, it is probable that it was about this time that the real inflation began which was later to deprive the United States Banks of their control of the situation.

The New York rediscount rate never rose above 4 per cent., and for the greater part of the time (1925–1928) it stood at 3½ per cent.

Moreover, there was no appreciable reduction in the "open-market assets" of the Federal Reserve Banks. The fall in commodity price level therefore, in so far as it was due to monetary influence, was caused by the credit restriction in Great Britain; not to any action taken by American bankers.

In 1927 the fall in commodity prices began to show signs of reacting on American business. The wholesale price index fell from an average of 146 in the first quarter of 1926 to 134 in the second quarter of 1927.

The index of manufacturing production, which had risen to 108 in 1926, fell to 106 in 1927. In August, 1927, we find that the trade reaction was showing signs of becoming pronounced, the index of production falling to 100 by December. The New York rediscount rate was brought back to 3½ per cent. from the 4 per cent. to which it had been raised in the middle of 1926, following a dispute with the Chicago Reserve Bank. At the same time, the Banks' holdings of securities were increased rising from $291 millions in May, 1927, to $606 millions in December, 1927. At the time that this reduction in the rediscount rate was made, it was generally understood to have been prompted in part by a desire to help the Bank of England and the other European Central Banks out of their gold reserve difficulties. It had by this time become evident on both sides of the Atlantic that, unless there was some co-operation between New York and London, international price stability was impossible.

Following this relaxation of credit in the United States, the sterling exchange, which had only temporarily touched parity since the return to the gold standard in 1925, and was at 4·855 at the end of July, 1927, had risen to above 4·88 by the end of the year, and remained round about that level until July, 1928.

An outflow of gold from the United States began in September, 1927, and continued until July, 1928. The Bank of England, which, though it had reduced the rate from 5 to 4½ per cent. early in 1927, had made it rigorously effective, received £24,000,000 of gold.

Early in 1928, as a result of this inflow of gold, the market rate weakened and an expansion of Bank credit occurred.

The fall in British wholesale prices, which had been proceeding steadily ever since the end of 1924, at long last showed signs of coming to an end, and in the first quarter of 1928 gave indications of an upward turn. During the year it seemed as though England might be about to regain her financial independence.

Unfortunately, during the year the Federal authorities had taken fright. An outflow of gold at the rate of $500 million a year and the rising tide of speculation on the New York Stock Exchange led to widespread protest against the Reserve Banks' "cheapening" policy.

In January the Banks had begun to reduce their "open market assets," and in February the New York rediscount rate was raised from 3½ to 4 per cent. These measures proving ineffective, the rediscount rate was increased to 4½ per cent. in May and to 5 per cent. in July; the export of gold stopped and the price level turned downward. Stock Exchange speculation, however, was unaffected, the prices of industrial stocks and shares and the volume of brokers' loans continued to go ahead.

From this point until the stock market collapse in October, 1929, the New York Stock Exchange boom dominated the international monetary situation. The Forecast of the Federation of British Industries for the first quarter of 1929 opened as follows: "Past experience provides no example of active expanding trade under monetary conditions at present persisting in Great Britain."

In the United States 1929 witnessed not only a cessation of new overseas investment, but also the withdrawal of funds from existing borrowers who were building for the future. A boom founded on stock-market speculation and the anticipation of future consumption could have only one end. For if a man spends to-morrow's income to-day, how will he live when to-morrow comes? Forecasting from now onwards was merely a matter of judging the end point.

The Federal Reserve Banks, finding that their policy of increasing rediscount rates by ½ per cent. had failed, seem to have lost heart for a time, and to have given up all hope of controlling the situation. Early in 1929, however, they reinforced their " open-market assets " policy, increasing by stages the acceptance buying rate from 4½ (*i.e.* ½ per cent. below New York rediscount rate) in January to 5½ per cent. in March (*i.e.* ½ per cent. above New York rediscount rate).

While, however, the rate for trade bills was pushed up to 6 per cent., the stock market remained unaffected. It may be presumed that this acceptance bill policy had been tried because of the refusal of the Federal Reserve Board to countenance a further increase in the New York rediscount rate, lest this should result in slowing down trade.

The acceptance policy having failed, despite the reduction of the bills held by the Federal Reserve Banks from over $500 millions to below $80 millions in July, permission was at last given, and the New York rate put up to 6 per cent. in August. Unfortunately, the acceptance rate was at the same time reduced to 5⅛, which appears to have more or less neutralized the effect of that step.

In the meantime, following the lead of the United States, and in order to protect their gold reserves and stem the tide of European funds across the Atlantic, monetary rates were rising all over Europe.

The British Bank Rate was increased to 5½ per cent. in February, and by July 13 other European centres had increased their rates. Thereafter it was only a matter of time before the collapse occurred. The British Bank rate rose to 6½ per cent. in September.

The following extract is from the Quarterly Issue of the Federation of British Industries Business Barometer of the 24th October, 1929, written just before the major break in the United States Stock Market:—

> " The difficulties of the international monetary situation which were fully discussed in the last two quarterly Supplements, have reached a critical stage, and the slowing up of the momentum of U.S. trade, which we suggested as a necessary prelude to relief from these difficulties, appears to be materialising. It seems probable that we are at the culminating point of what may prove to be the peak of the first major international business cycle movement since the liquidation of 1920–1921.
>
> " As this suggestion may surprise those who still look at the affairs of the business world through pre-war eyes and are accustomed to measure trade movements by price level indices con-

structed on the basis of pre-war experience, it may be explained that our deductions depend on the view that, since the war, the centre of activity of business has been tending to shift away from mineral industries and trades associated with capital development in the pre-war period towards the 'consumption' industries, public utilities services, and allied occupations.

"Fortunately, there is no reason to believe that the present liquidation will approach, either in intensity or extent, corresponding movements in the pre-war period, or that of 1920–1921. The main pressure is likely to be centred in the U.S.A., its reaction on British industry and employment being moderate and of temporary duration only."

I should add that when the above was written it was not foreseen that the collapse of the American post-war superstructure would reveal so many serious cracks in the basic sub-structure as to threaten the stability of the whole system of world trade. This did not begin to become apparent until about the middle of the following year, when the extent of America's over-investment began to be appreciated.

Henceforward forecasting is likely to be a perilous adventure until either a single international monetary system is reconstituted or, what appears more probable, it is replaced by a group of such systems.

(5) *Conclusion.*

Lack of space has compelled me to limit myself largely to changes on the "supply" side, but, on the "demand" side also, it seems obvious that man's interference with the existing balance of nature and distribution of occupations has not infrequently unleashed changes, if not as revolutionary in their effect on the development of trade as gold itself, at any rate comparable in their results to the liberation, for example, of the first English rabbits in Australia. The invention of the cheap motor-car, for instance, has undoubtedly led to a basic transformation of the world's commercial environment.

Again, our political actions have often had unexpected economic consequences as disastrous to industrial enterprise as the casual throwing away of the piece of Canadian water-weed which, according to Professor Huxley, caused the blocking up of half the waterways of Britain for a decade.

Turning to current changes in world conditions, we find Russia, on the one hand, seeking to achieve in five years a state of industrial development which took nearly seventy years to complete in the United States, while the United States in her turn is busy seeking an escape from depression by trying to devise plans to anticipate her own future at an almost equally rapid rate. Though many people appreciate the over-ambitiousness of the former programme, few appear to realize the rashness of the latter, which may be likened to attempting to plan ahead for a " motor age " before the first motor-car has been invented; nor that she is trying to repeat the mistake largely responsible for producing the present world crisis. During the war and reconstruction period, the world may be said to have been anticipating its savings many years ahead and spending them in directions which were both non-reproductive and opposed to the natural trend of evolution. The planning which the world immediately needs relates to the present more than the future. To seek to recover balanced progress should be our objective rather than to try to anticipate the future more rapidly. Production and consumption in many directions are still being forced more and more out of step. With their almost limitless output capacity, modern production machines flood goods on the market at a rate far beyond that both which the natural habits and humanity of the ordinary consumer will tolerate, and at which it is possible to provide new outlets and occupations to replace existing markets and employments as these become surfeited.

These are spectacular examples. Even our everyday and more humdrum actions can unchain impulses which may tend to drive us onward at a speed outstripping our capacity of adjustment. Every trade cycle seems to have had its own special instances whether in the field of invention or geographical redistribution of occupations, or in both. Perhaps the recent breaking of the " golden bowl " at a time of slowing up in population growth may be a sign that the years are drawing nigh when certain countries will cease to have pleasure in rapid change, preferring an " age of leisure ".

For assistance in writing this paper I am under a deep obligation to Mr. A. L. Please, who is mainly responsible for collating the statistical material and preparing the charts.

APPENDIX I.

DESTINATION OF NEW MONETARY GOLD 1890–1910.

The distribution of this new gold for monetary purposes is best explained by the United States Mint, which reports on the general subject of gold absorption during the twenty years. Reviewing the decade 1890–1899, the Mint points out that the increase in production ($9,000,000,000 as compared with the decade 1880–1889) was

> "largely taken for the reorganisation of monetary systems and for strengthening bank reserves. The gold reserves of European Banks increased by 75 per cent., while the paper issues increased less than 5 per cent."

Of the gold flowing into European Banks ($686,000,000 in all) no less than $535,000,000 were taken by the State Banks of Austria-Hungary, Russia, and France, the first two being engaged in reorganizing their currencies on a gold basis and France continuing her policy of accumulating gold after suspending the free coinage of silver. On the decade 1900–1910 the Mint comments:

> "An examination of the individual gains of these institutions will show that a large amount of the new gold taken by Europe has been devoted to the same purpose as in the preceding period, to wit, the rehabilitation of monetary systems and to strengthen and buttress the institution of issue.
>
> "In South-eastern Europe, four countries, chiefly devoted to agriculture—to wit, Bulgaria, Roumania, Servia, and Turkey—have taken since 1899 approximately $48,000,000 for their banking institutions, which previously held insignificant reserves of gold.
>
> "Italy is one of the important countries of Europe which ten years ago had an inconvertible paper currency, but has since acquired large reserves of gold.
>
> "Of the total gain, $863,000,000 made by all the European Banks, South-eastern Europe, including Austria-Hungary with the four countries already named, and Italy, Russia, and France, took $729,568,000, and all other banks of Europe, including those of the United Kingdom, secured $133,000,000.
>
> "In this connection it should be noted that although the Bank of France increased its gold reserve during this period by 75 per cent., its discounts and advances increased only 5 per cent. In short, the distribution of new gold in Europe does not appear to have been such as might be expected to have a large influence upon prices. To a great extent it has evidently been governed by national or banking policies, the banks that have most largely increased their reserves having resolved for business or political reasons upon this course.
>
> "The Bank of the Netherlands has increased its holdings from $18,000,000 to $50,000,000, while the Bank of Belgium has increased

its holdings from $21,000,000 to $24,000,000, and there is no corresponding increase in the business of the two institutions. In fact, the latter is now the larger institution of the two.

"The two countries of Europe which made the greatest industrial progress during the period were unquestionably the United Kingdom and Germany, and of the $863,000,000 distributed to all the European banks of issue, the two great banks of issue which hold the final reserves of money and credit for these countries secured less than $60,000,000.

"England, sitting at the crossroads of the world's exchanges, financing enterprises in all quarters of the globe, handling a larger volume of international credits and payments than any other country, and owning more gold mines than any other country, presents the anomaly of holding less of the new gold than any other important country. The loans and discounts of its banks increased $450,000,000 with a gain of only $10,000,000 in its reserves.

"Canada makes a notable showing of increased reserves and credits, the gold stock rising from $22,000,000 to $85,000,000 and the bank loans from $251,000,000 to $870,000,000, but in attempting to trace the influence of this gold and credit upon prices, it is to be considered here, as in the case of South American countries, that they have been chiefly used in increasing the production of food supplies and raw materials. The chief products of Canada, wheat and flour, are among the commodities of the price tables which show the smallest percentage of advance over former years. The full effects upon the prices of food staples of this expansion of industry and credit in Canada has not yet been felt. A large increase in the production of these commodities is, no doubt, impending.

"The country which appears as the largest factor in the absorption of gold and in the expansion of credit during the period is the United States. The banks and Government Treasury increased their gold holdings by $702,927,944, the national banks increased their note circulation $557,800,000 and the national and State banks together increased their loans and discounts from $5,167,895,610 to $12,855,503,194. The gain in gold was 106 per cent. and in bank loans 115 per cent."

The United States Mint's summary, it will be noted, ends with 1910. The Canadian Board of Enquiry into the cost of living 1900–1914, amplifies the above statement in the light of subsequent data.

"The increase in total gold stocks between 1900 and the end of 1912, $859,300,000, or nearly one-fourth, was secured by the United States, which on 1st January, 1913, held $1,879,500,000, as compared with $1,020,200,000 on 1st January, 1900. The next largest increase by any one country was by France, which had up to 1913 added $389,400,000 to her total stock, bringing it up to a total of $1,200,000,000, but the latter figure is an old estimate, and almost certainly too low. India stood third with respect to the increase, with a gain of $351,800,000, whereas her total stock on

1st January, 1900, was only $22,200,000. These figures well illustrate the phenomenal absorption of the yellow metal by India in recent years. The next largest gain was by Argentina, which on 1st January, 1913, held $281,400,000, practically all of which was accumulated during this period. Other important gains were those made by the United Kingdom, $244,200,000; Russia, $208,500,000; Canada, $127,800,000; Brazil (which raised its gold stock from practically nothing in 1900, to $125,500,000 at the beginning of 1913); Egypt, $160,000,000; Germany, $165,500,000, and Italy, $151,300,000."

(Details of the effect of this new gold on general money supplies, *e.g.* loans, discounts, deposits, etc., are also given in that Report.)

APPENDIX II.

Post-War Changes in Monetary Gold Stocks of the World

($000,000's.)

	1913.			1928.		
	Gold Reserves.	Other Monetary Gold Stocks.*	Total.	Gold Reserves.	Other Monetary Gold Stocks.*	Total
Europe, excluding Russia	2,050	2,448	4,498	4,245	76	4,321
Russia	787	254	1,041	92	—	92
Europe, including Russia	2,837	2,702	5,539	4,337	76	4,413
North America ...	1,451	635	2,086	3,937	395	4,332
South America and Cuba, Mexico, etc.	348	139	487	799	312	1,111
Asia†	217	146	363	753	—	753
Africa	46	25	71	68	17	85
Oceania	46	181	227	141	114	255
World	4,945	3,828	8,773	10,035	914	10,949

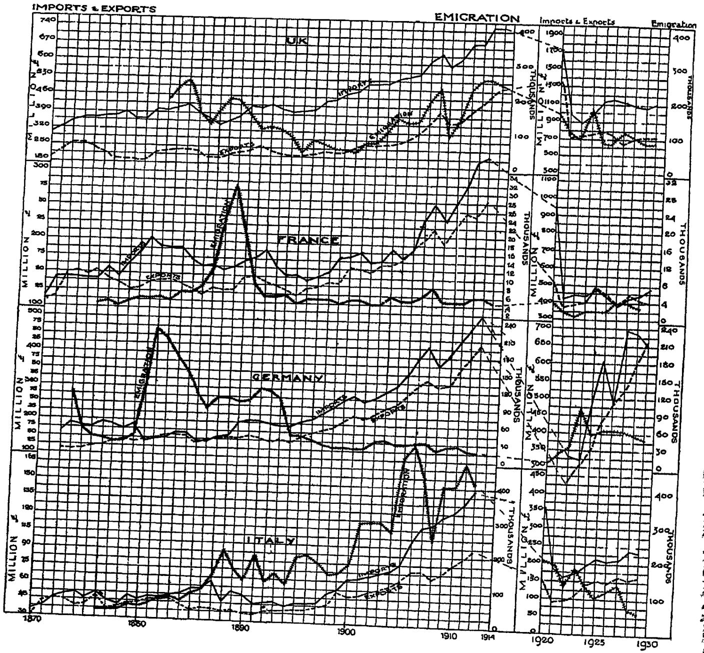
* Mainly gold in circulation, including holdings of commercial banks.
† Excluding China and hoardings in India.

Note.—The gold reserves in 1928 in the very great majority of countries are known, and require no process of estimation, while the amount of gold outside banks of issue and Treasuries is small. The accuracy and completeness of the returns of gold reserves in 1913, on the other hand, are sometimes open to doubt, and, of the total monetary supply, nearly 45 per cent. is believed to have been in the hands of the general public, commercial banks, etc. The quantity of gold not in central reserves can, of course, only be estimated, and, owing to the manner in which such estimates are normally compiled, it is by no means impossible that the total monetary gold stock in 1913 was somewhat lower than is indicated in the table (perhaps about $500 million lower). On the other hand, the other monetary gold stock in 1928 may have slightly exceeded $914 million.

APPENDIX III.

CHART "A."

DEVELOPMENT OF INTERNATIONAL TRADE AND MIGRATION, 1870–1914 AND 1920–1930.



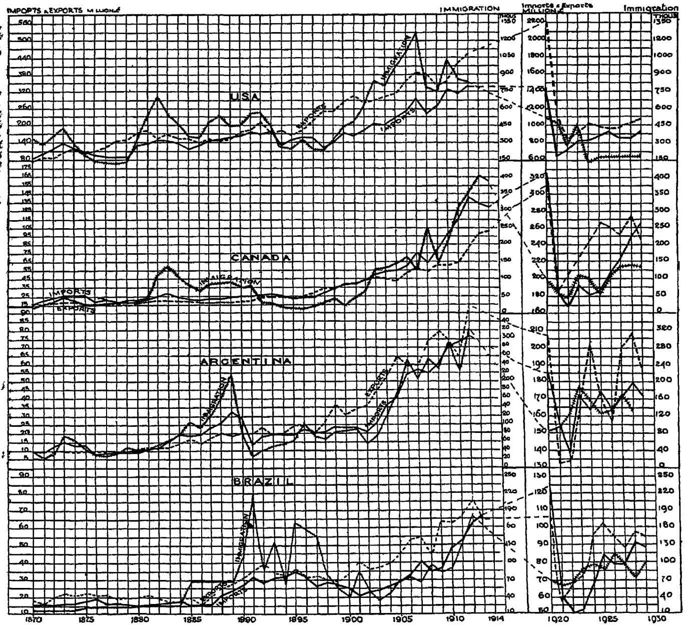
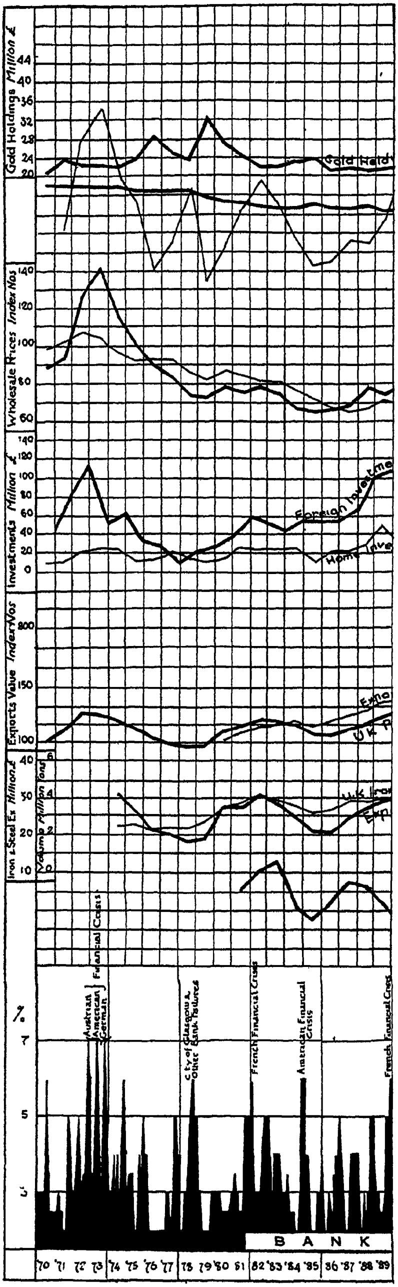


CHART "B."—BRITISH TRADE CON-



EXPLANATORY NOTES.

As is well known, trade development in the past has been neither a regular nor a continuous process, but has taken place by a series of alternate waves of prosperity and waves of depression. The course of these fluctuations is commonly referred to as "Trade-Cycle" movements.

A comparison of the curves in this Chart with those in Chart A shows that the influence of these trade-cycle movements was not confined to British emigration, foreign investment and exports, but was international.

Incidentally, it may be noted that the close correspondence between the movements of mineral prices and those of the other curves lends support to the view that there has been a close connection between the prosperity of our constructional trades (the prices of the raw materials of which mainly comprise the mineral index number) and the state of our Foreign Trade and Investment.

The following are the sources from which the statistics for the curves have been taken:—

(A) GOLD HOLDINGS OF THE BANK OF ENGLAND.

The annual average of the weekly statistics issued by the Bank of England. Post-war curve includes currency notes.

(B) RETURN ON CONSOLS AND RATE ON MONEY.

I. The annual average return on Consols from the Statistical Abstracts of the U.K.

II. The annual average rate on three months bank bills as calculated by the *Economist.*

(C) WHOLESALE PRICES.

Mineral Prices, the annual *Statist* Index Number. All prices (excluding minerals). The annual arithmetical average of the other three groups in the *Statist* index-numbers, viz.: Total Food, Textiles, and Sundry Materials. (Note that the post-war scale has been lowered.)

(D) INVESTMENTS.

Home—1870–1913: The figures calculated by C. K. Hobson in *Export of Capital.* 1919–1925, the figures compiled by the Midland Bank.

Foreign—The foreign issues throughout the period are moved on one half-year in the graph to allow for the interval between flotation and expenditure on construction. 1870–1913, the adjusted statistics as given by C. K. Hobson in *Export of Capital.* 1919–1925, the figures compiled by the Midland Bank.

(E) EXPORTS.

Value of British Exports, obtained from the Annual Statement of Trade.

Volume of British Exports, as calculated in the *Economist* on base 1880 = 100.

(F) IRON AND STEEL EXPORTS.

Value of Exports extracted from the Annual Statement of Trade.

Volume of Exports in Tons as given in the Annual Statement of Trade.

(G) EMIGRATION.

The annual outward balance of British passengers from U.K., according to the returns published in the United Kingdom Statistical Abstracts.

(H) BANK OF ENGLAND BANK RATE.

DITIONS, 1870–1913 AND 1919–1930.

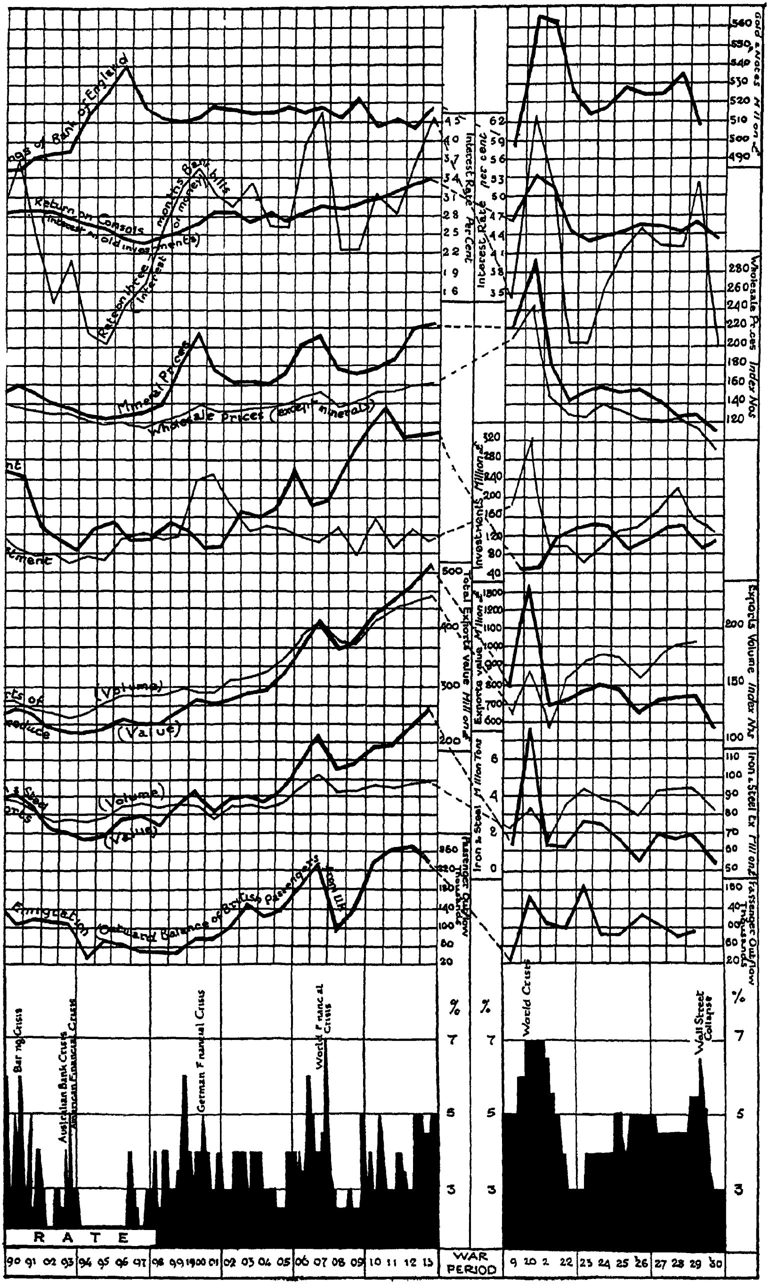


CHART "C."

BUSINESS CONDITIONS, 1850–1913.

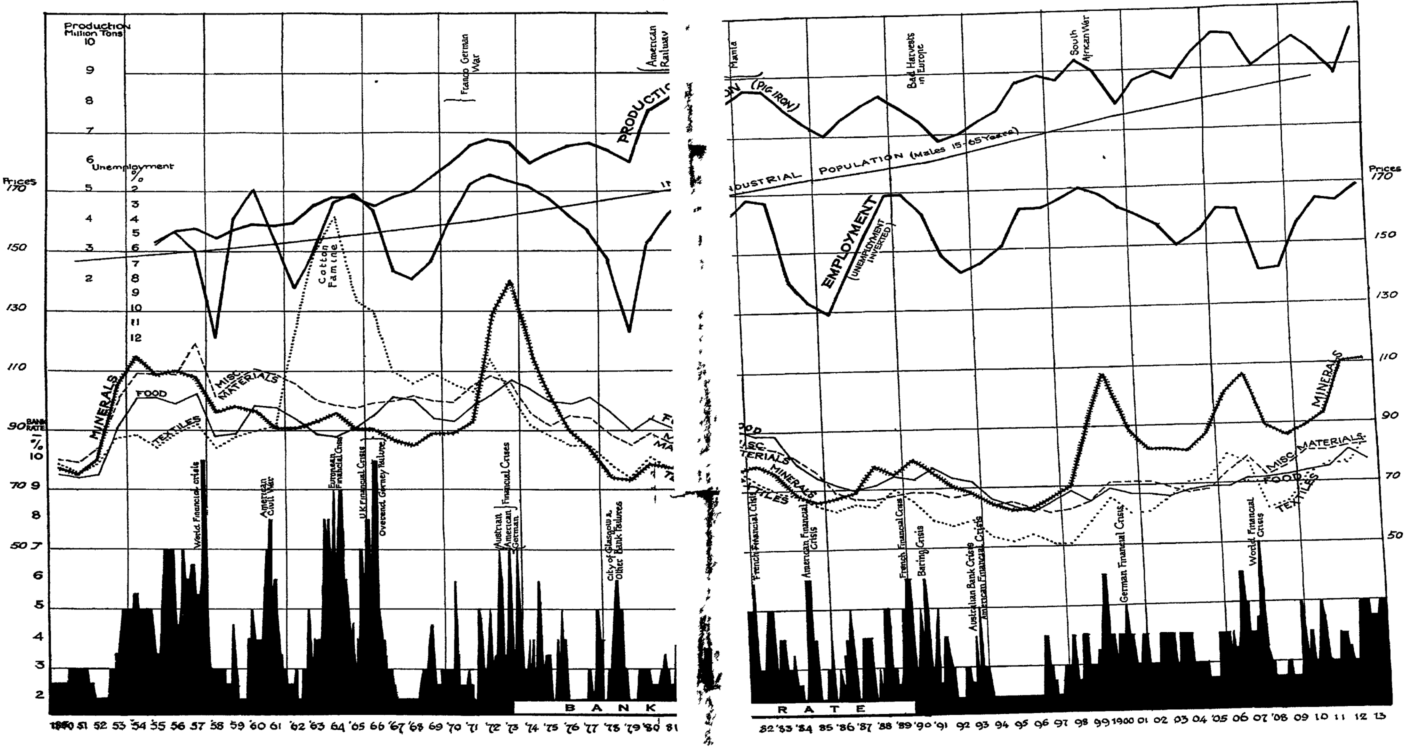
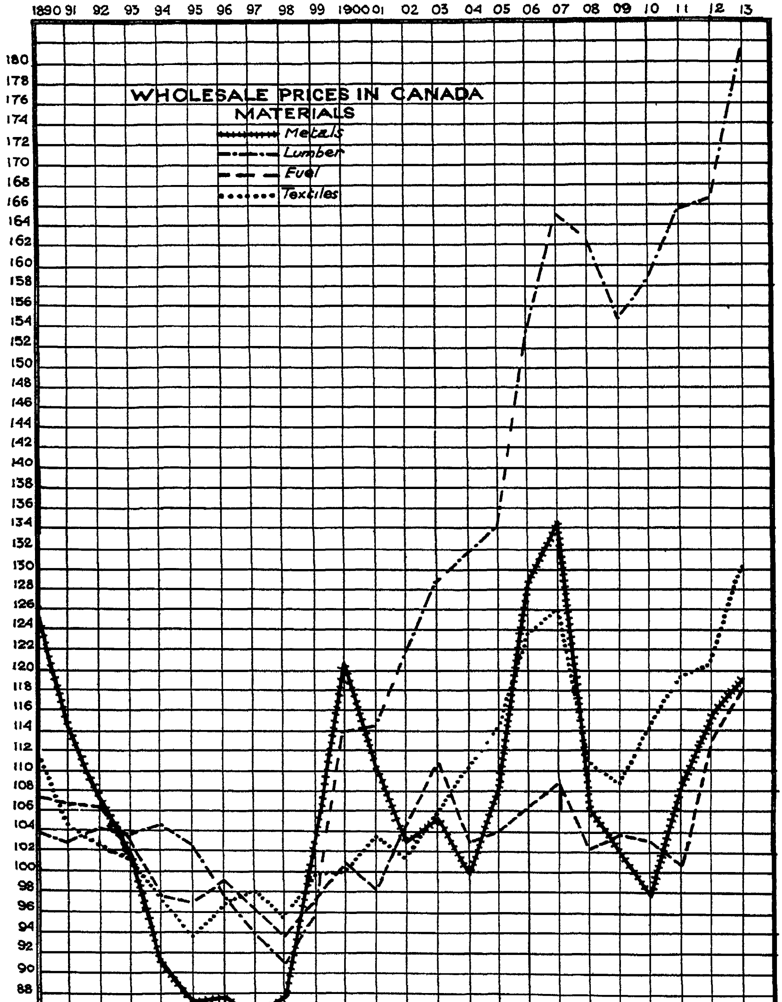


CHART "D."



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WHOLESALE PRICES IN CANADA
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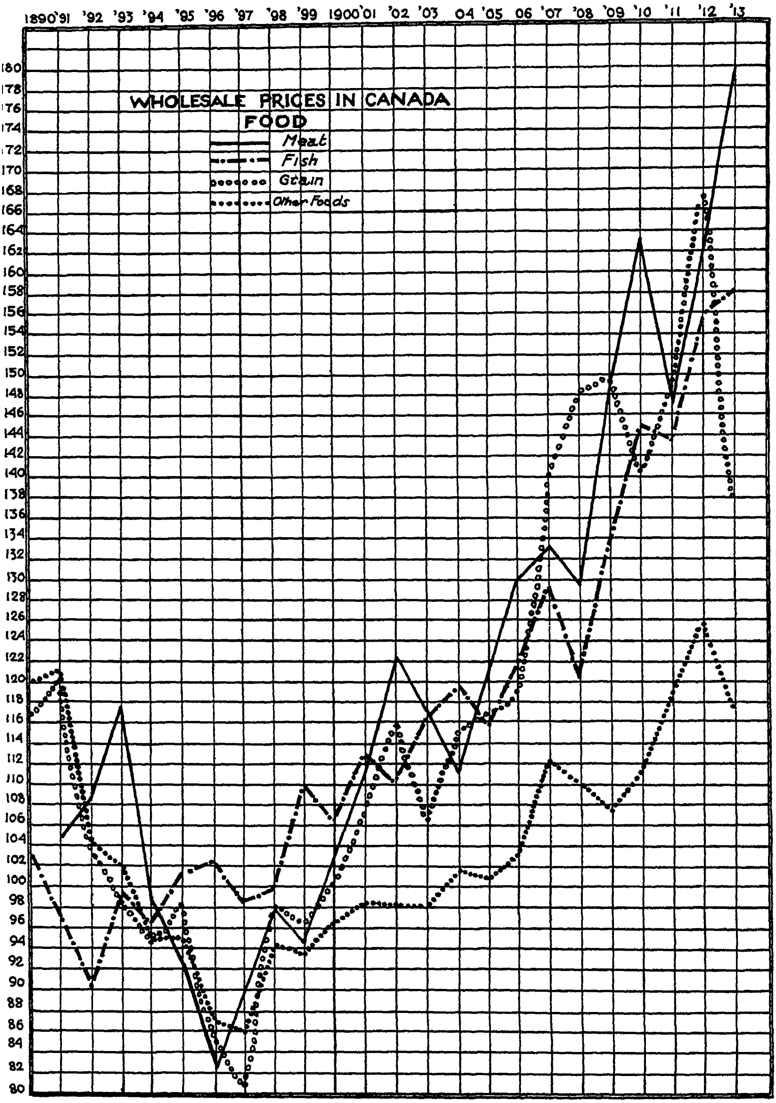
Lumber
Fuel
Textiles

CHART "E."


WHOLESALE PRICES IN CANADA
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DISCUSSION ON MR GLENDAY'S PAPER.

MR. R. G. HAWTREY: It is a real pleasure to offer the Society's thanks for a paper of such thoroughness and magnitude. I think it is important to bear in mind how valuable are the views of one who is watching these phenomena from day to day, and who sees the recent past with the acuteness of perception of a contemporary who had to watch the events as they happened.

There are a number of points which it occurred to me to criticize, and my criticisms are largely in the nature of asking for elucidation. In the first place, I think we should bear in mind the distinction between various movements and changes which a trade barometer is intended to record; we should distinguish between the cyclical fluctuations and those processes of growth on which Mr. Glenday has laid greater stress. In the past when people in authority—such as the Chancellor of the Exchequer introducing the budget—have made pronouncements as to the state of business, we shall find that in general what they had really been talking about has been the trade cycle. I do not refer to post-war pronouncements, but to the half-century preceding the war, when every Chancellor of the Exchequer thought it necessary to say something about the state of business, and what he said referred to the cyclical position of business. We have tended to become preoccupied with the cyclical movement to the exclusion of the long-term processes of growth.

Mr Glenday starts with the idea of bringing out the relation between the two, particularly showing how the monetary disturbances, which personally I should say are at the root of the trade cycle, are also related to the processes of growth. He suggests that in order that new industries may take root, it is necessary either that there should be an increase in the supply of money, or alternatively a decrease in the price level, to enable room to be made for the absorption of the products of the new industries. I am not quite sure that the alternatives suggested by Mr. Glenday really do state the situation quite adequately. If you suppose monetary disturbances to be eliminated, it is quite clear that the real alternatives are the following—either industry is employed up to capacity, in which case any new process or industry must displace some part of the old ones or industry is under-employed, when a new industry may be started without any of the others contracting. The question of the effect on the price level is really inessential; the process of displacement may involve a fall in the prices of some or all of the old products, with the consequent shrinkage in their prosperity and the displacement of capital and labour. The essential point is rather to be found in what phase of the trade cycle this process of growth occurs. I do not definitely contradict what Mr. Glenday says, but I think this is a more satisfactory analysis of that point.

Another point is Mr. Glenday's position in regard to working capital. When he referred to working capital he seemed to me not to draw a sufficiently clear distinction between cash balances and additions to physical working capital in the form of goods in process and goods in stock. What actually happens when an extension of working capital is necessary is that the businesses which require it will raise money either by raising capital in the market, or alternatively by borrowing from banks. The greater part of that money will thereupon be spent, and the addition to working capital consists mainly of the additions to goods and stocks in process. The passage in which Mr. Glenday refers to working capital rather suggests that industry requires an addition in the form of an addition to its cash. It is true that expansion often does require some addition to the cash balance, but the process by which an additional supply of money fertilizes industry does not consist in the absorption of additional balances by industry; it consists in the generation of additional incomes in favour of the people engaged in the industry; the incomes are spent, and the additional money appears in the form of additional circulation supported by some additional cash balances in industry, but also in additional balances in the hands of consumers.

What I have said does not materially modify the line of argument adopted by Mr. Glenday; it remains true that monetary expansion is necessary to allow of industrial expansion unless industry passes through the painful process of the reduction of the price level. I need not enter into details of that, but it is substantially true that whenever an expansion of industry occurs, monetary expansion is involved, particularly an expansion of incomes. The extent to which an expansion of the cash balance is involved is a highly complex matter, dependent partly on the effect of business activity on the velocity of circulation.

Another point to which I should like to call attention is the relation of the short-term rate of interest to these monetary movements. There, again, I do not fundamentally differ from Mr. Glenday's position, but I think that the actual relation of the short-term rate of interest is a little more complex than he allows. He bases his analysis—as I think quite rightly—on a comparison of the short-term with the long-term rate of interest, thereby eliminating from the variations of the short-term rate those changes due to changes in the long-term rate, but the association that he establishes, or quotes, between movements of the price level and short-term rate of interest seem to me to take inadequate account of this complication—that a high short-term rate of interest tends to cause a fall in the price level, and a fall in the price level tends to cause a low short-term rate of interest. There are two contrary correlations. In the same way, a low short-term rate of interest and low bank rate tend to bring about a rise in the price level, but a rising price level tends to bring about a higher bank rate.

I do not think that any analysis of the facts in regard to rates of interest can be quite adequate unless that complication is taken into account. I do not want to suggest that Mr. Glenday might have put more labour and pages into his already long and obviously extremely laborious paper, but I have raised these two or three points in the hope that they may lead to some elucidatory remarks later on, and possibly clear up some minor blemishes in this excellent paper.

Mr. H. W. Macrosty: It gives me very great pleasure to second the vote of thanks to Mr. Glenday. I think his apology for daring to venture into this subject was quite unnecessary. We have suffered so much of late from all the old authorities who have lectured us on this subject that a new voice coming from the business world is thoroughly welcome. I had noted a whole host of points upon which I wanted to make some comment; that was inevitable with regard to a paper like this, which stretches in its survey from Aurignacian times to the present crisis, but I must confine myself to one or two comments only.

Mr. Glenday includes a table of gold production from 1492 onwards. He does not make very great use of that table—I think on the whole he was wise in not doing so—and it might quite well have been left out without any damage to the paper. Some people appear to think that a kind of sanctity attaches to the old records of the production of gold, but I cannot bring myself to believe that the statistical methods of the fifteenth and sixteenth centuries were a bit more accurate than those which we have had in the last century —and those have not been free from criticism. I stress this point because some people have laid great emphasis on the importance of a knowledge of the stock of gold in 1850, and seem to think that they know it quite accurately. Incidentally, those old records do not show that large additions to the monetary circulation of the world came not from current gold-mining but from temple plunder, and that was by no means insignificant. I agree pretty closely with Mr. Glenday in his history from 1850 onwards. I am glad to see that he has remembered what some people have forgotten, that from 1850 down to 1870 the world was really not on a gold basis, but substantially on a silver basis outside this country. But I cannot agree with his suggestion that there is a tacit understanding that all credit instruments are convertible into gold, and that therefore gold movements can be taken as a rough indication of changes in the monetary supply. I think that is entirely contrary to the history of the last three-quarters of a century.

Coming to the post-war period, I would suggest to Mr. Glenday that sufficient attention has not been given to two or three points. I think that a good deal of our trouble has been due to the reckless lending by the Banks in 1919 and 1920, which has resulted in their having accumulated so many bad debts in good times that in bad times they have found it difficult to carry good debts. Secondly, I think that the effects of the industrial crisis of 1926 have been entirely under-estimated, and that there has been a mistaken tendency to attribute a great deal of the evil results of that period to the restoration of the gold standard the previous year. Thirdly, I think that the complicated manœuvres of the French financial authorities in connection with the repatriation of the old gold deposit in 1927, and the raids on gold preparatory to the restoration of the franc, have had a great deal to do with creating disequilibrium in monetary supply.

On p. 38 Mr. Glenday says that: "The choice before the Bank of England lay between encouraging British trade and the absorption of the unemployed into industry by allowing British credit to expand *pari passu* with that in America—and adopting a policy of credit restriction, and so preventing a rise in the British level in order to improve our exchange. In July, 1924, the decision was taken to restrict credit." Now, I have been looking into some of the figures published by the Macmillan Committee, and I find that the average balances of cash in the Bank of England recorded by the London Clearing House Banks in the second part of 1924 compared with those of the first half—eliminating the months of June and December for obvious reasons—showed a reduction of only two per cent., and that the corresponding reduction in current accounts was under one per cent., so that the restriction of credit was quite moderate. Coming to 1925 and the following years, the average monthly amounts of bank balances shown in the accounts of the Bank of England fell somewhat sharply in 1926, more slowly in 1927 and 1928, sharply again in 1929, and had a moderate recovery in 1930. During that time money was appreciating in value and, thus measured, balances increased moderately in 1926–8, but sharply in 1930 after a slight set-back in 1929. More business could have been carried on with the help of the credit that could have been based on those balances; but I cannot relate the movement of balances with either the London-Cambridge Index of Production or the Board of Trade Index of Production. That potential purchasing power was not taken up by industry, and I can only conclude that it was used by the Banks in non-industrial directions.

On the question of forecasting, I think that since the war forecasting has been a very temerarious business, more particularly since government and other financial transactions have had at least as much to say as trade movements in determining the flow of money. Yet every business man must make some attempt to forecast what is likely to happen in at any rate the near future. I am not a business man, but if I were I think I would try to reckon up what was likely to happen, first taking stock of the psychological influences of the moment; then I would use the information I myself possessed of my particular business, and that got together by my Trade Association. I would form my own opinion of the material factors in this way, and then have a talk with my bankers.

MR. OWEN FLEMING wished to add his testimony to the words of Mr. Hawtrey and Mr. Macrosty as to the great value of the paper to which they had had the honour of listening. The paper was not only of great interest, but it contained certain sparkling jewels.

Mr. Glenday said that gold was a token of uprightness and excellence, the symbol of morality and incorruptibility. That was a very fine definition of gold, and the speaker had often thought that for absolute integrity and honesty of purpose it would be unnecessary to go very far from the Royal Exchange. Mr. Glenday had also mentioned that the future life of the community might well be on less lavish and optimistic lines than hitherto. Was high thinking to go with plain living?

At this stage of economic life it was necessary to consider what was meant by progress. The real definition of the word "progress" was a movement from one place to another. At this moment the nation was at the beginning of a great adventure, and none of the English people knew where they were going; therefore one of the first points to be considered was to find out what was really meant by "progress," and what should be their objective.

The speaker said he had begun to read the advance proofs of Mr. Glenday's paper when travelling in an omnibus from an old village in Kent with a fifteenth-century church and fine houses built from the fifteenth to the eighteenth century. The bus proceeded on its journey through Catford and Lewisham to London, by way of the Old Kent Road. Catford and Lewisham typified not unfairly the product of the "progress" of the twentieth century, while the Old Kent Road was the similar product of the nineteenth century. Did these works really represent true progress? If he had a friend from America, he was not sure that he would take him to the Old Kent Road.

During the summer he had made a journey from Henley to Oxford, Warwick, Leicester, Uppingham, Stamford, and King's Lynn, and on the way had passed some magnificent historical and architectural country; but he was concerned with the modern developments about Nuneaton and Leicester. Could these be said to be "progress"?

Mr. Glenday had said that progress, in the sense of continuous growth, was quite unknown to the ancient Greeks. In opposition to this view might he venture to quote as evidence some words of Plutarch? Referring to the works that had been carried out in Athens under Pericles, he wrote: "As the buildings rose, stately in size and unsurpassed in form and grace, the workmen vied with each other that the quality of their work might be enhanced by their artistic beauty. Most wonderful of all was the rapidity of construction." The buildings described by Plutarch exist in Athens to-day, and are still the object of universal admiration. Can anyone, therefore, venture to support an assertion that "progress" was quite unknown to the Greeks? On the contrary, was it not true that during the nineteenth and twentieth centuries there had been great misunderstanding in England as to the real meaning of progress? People had been content to build vast numbers of ugly houses, and the real things of value had been put on one side. It had all been quantity—more houses, more trains, more telegraphs, more roads—but did that constitute progress?

A time may be coming when the international struggle for a livelihood may well assume an intensity that will test every fibre of Britain's national life. Would the correct answer to that challenge lie in yet more factories, more motor-lorries, longer working hours, and a fiercer class war? He could not think that to be the correct road. "Mass production" was perhaps suited to vast continental areas, but not to a highly cultivated little island like Great Britain. Would it not be a statesmanlike procedure to advise our people to give up this craving for quantity, and to replace it by an intensive study of quality? It would be better to change now, and concentrate on quality, and to realize that this was the essential thing, and not quantity. If quality were to be regarded as progress, rather than quantity, our future national development would have to be on entirely different lines. There would then be no further desire to destroy the fine work of the architect Robert Adam, in whose beautiful hall they were at the moment sitting. There would be change in many other ways, and study of form and colour and the various beauties of life, instead of the wasting of energy on what appeared to his humble judgment a complete misconception of the real meaning of the term "progress."

MR. UDNY YULE said he only wished to speak briefly on a purely technical point—as regards the correlations given on p. 29. He wished to point out that the probable errors* there given were really beside the point, for it was not possible to work out the probable errors of these correlations on the ordinary formula. No one knew what was the probable error of the correlation between two time series; for certain types of time series, the coefficients of correlation tended towards the values plus or minus one. He would refer the author to his paper on "Why do we sometimes get Nonsense Correlations between Time Series" (*Journal*, 1926). The meaning of the correlations obtained was much more doubtful than the probable errors given seemed to suggest.

PROFESSOR BOWLEY asked that the probable errors referred to by the previous speaker should, with the author's consent, be cut out from the paper as published in the *Journal*, because everyone who had watched the use of coefficients of correlation knew how easily they led to misunderstanding.

MR. LOVEDAY said he spoke with some hesitation, for although he had read Mr. Glenday's paper with very great interest, and agreed with the greater part of it, he was not quite clear as to the general conclusions of the paper. One conclusion which Mr. Glenday seemed to indicate at the beginning was that from the point of view of the business man it was important to have indicated in the various so-called barometers of economic conditions, not only the cyclical movements but the trends, and in that connection he went on to argue that that trend was likely to be affected by the magnitude of the monetary supply. By inference it might be taken that Mr. Glenday argued that the magnitude of the actual monetary supply was likely to be dependent to some extent upon the gold supply, and in that connection he referred to an estimate put forward by the Gold Delegation to the League of Nations, to the effect that in all probability the supply of gold in the future might prove inadequate. That forecast had been criticized very reasonably and helpfully on the grounds that it was impossible to foretell with certainty what the gold production would be, or what would be the effect of developments in banking practice. Both criticisms were sound and it was thoroughly desirable that they should be made, but at the same time this was a great practical issue and every practical man had to determine his policy on probabilities.

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* Now deleted in accordance with the criticism.

The other argument, more recently made, was that in view of a fall in prices, the demand for gold was likely to be much less in the future, and that therefore there was no need for worry. This point would appear to be much more doubtful. To begin with, the fall in the general price level had not very substantially affected the demand for gold, in so far as that demand was measured by the total note circulation, plus sight liabilities, of the Central Banks. His estimate of these in the main gold standard countries of the world, would be as follows:

	$(000,000's)
For 1928,	24·6
1930,	25·7
1931 (June),	25·1

The smallness of the change was perhaps a little puzzling, but, when one came to think of it, it was not so surprising. In the first place, the retail prices had not fallen to anything like the same extent as the wholesale. The velocity of circulation contracted much more rapidly than the media of circulation. In addition, the sight liabilities of Central Banks tended to increase during a period of depression, partly because the commercial Banks naturally tended to increase their reserves. On the other hand, there was a certain amount of note hoarding, which was an exaggerated form of diminishing velocity. So much for one side of the equation.

So far as the other side was concerned, there had been an astonishing increase in the actual supply of monetary gold. Monetary gold stocks had increased between December 1928 and June 1931, by about 1,053 million dollars, whereas the total production of gold in that period was 1,025 million dollars; that was to say, that more than the total amount of gold produced in the world in the last two and a half years had gone to money. That was an amazing circumstance, due to a number of causes upon which it was impossible now to dwell, but largely to the amount of gold which had recently come out of China.

On the other hand, it would seem that one was faced by a very grave danger that the gold exchange standard, as it had operated in the last six years or so, was seriously threatened. The countries which were on the gold exchange standard had not adopted it very readily, or maintained it very happily; they felt a certain inferiority complex, and they had in addition a number of sound objections to it. One objection which was important, and had become extremely so, was that they were afraid that after all the currencies in which they kept their reserves might be affected. One of the most important currencies in which they had kept their reserves had been very seriously affected, and the possibility had to be faced that the gold exchange standard would not be revived, at any rate in the form in which it had existed. If that were the case, then the situation, so far as the supply of gold was concerned, might be very serious indeed.

At the end of 1930 there were foreign exchange reserves kept by Central Banks amounting to 2,900 million dollars, with which might be compared gold reserves of about 11 milliards. If all the people who held foreign exchange were going to abandon that system and convert their foreign exchange reserves into gold, it would mean an increase in the demand for gold equalling 20 per cent. of the total of all forms of reserves of Central Banks. That would create a formidable scramble for gold, and if Mr. Glenday was correct in saying that the trend of prosperity was seriously affected by the volume of money available, and secondly, that the volume of money available was seriously affected by the supply of gold available, then, unless some modification of the old gold exchange system were devised, the prospects for the future were bad.

SIR JOSIAH STAMP said he would like to interject that a suspicion was growing in his mind that in the title Mr. Glenday had chosen for his paper he was, in a scientific and respectable way, "pulling the legs" of his hearers. He had, with the utmost appearance of frankness, issued invitations to his laboratory, and offered to show all his apparatus, but he had withheld the one final formula which would enable all this matter to be brought into action. It was as if one went to a great violinist and asked how he produced his magnificent music. He would say, "You must first of all look at the instrument and make sure that it is a good one, make certain that you have the right bow and the right amount of resin"; then he would say that a lot depended upon the composer, and the piece of music played, and it was also necessary to observe fully all the signs and intervals in the sheet of music. He would then add, "There! I have told you all I know; now go ahead and play it!"

If Mr. Glenday were asked precisely how he forecast, he could only answer that it was necessary to steep oneself in all these considerations, and then, under their respective stimulations and inhibitions, substitute one's own personality, and think. That seemed to be as far as it was possible to get. To be a successful forecaster it was necessary to observe these principles, and then think. Mr. Glenday was not going to give the magic rule of thumb that might have been hoped for, but he had shown some of the essentials necessary for practical forecasting.

DR. HAYEK said that Mr. Glenday's paper was so formidable in magnitude and content that he had not had enough time to study it in full, and for this reason he felt that were he to attempt to discuss the paper or offer criticism now, he would do Mr. Glenday injustice. He also felt that were he to start discussing one of the sections from the general point of view, in the present situation it would be impossible to do so without discussing all the most important tendencies and questions of the connection between gold and the fall of prices. For these reasons he asked to be excused from taking a more active part in the discussion.

Mr. N. Crump said that in supporting this motion he could not help looking back over a period of eight years to a time when, in a club near by, Mr. Glenday explained to him the various ingredients he proposed to put into his forecast. It was extraordinarily amazing to see the quantity and quality of deductions that had been evolved from what were then a few simple ingredients, and yet he had one or two doubts in his mind which he would be glad to have elucidated.

First of all, there was the time element. Was this a forecast for a few months ahead or for a few years ahead? In his preamble Mr. Glenday rightly pointed out that manufacturers had to lay their plans for several years ahead. Hence the presumption was that each forecast issued by Mr. Glenday was a forecast for several years ahead, and this presumption was supported by the entire tenor of the paper. The forecasts, however, came out every three months, and this at once placed the manufacturer in a dilemma. Was he to act on the June forecast, or, seeing that he had to make a decision that would commit him for years to come, would it be better to wait for September? And that way madness lies.

In any case, if it were regarded as a short-run forecast the manufacturer would be at the mercy of countless incidents which might trip him up. Going back in political history for eight or nine years, the Prime Minister of the time had to make an important decision which he was being pressed to make by his colleagues in the Cabinet. The story went that the Prime Minister was suffering from bad toothache when he attended that Cabinet meeting, and, as a result, he made a decision which led to the fall of the Cabinet, to a General Election, and to the advent to power of a new Government which introduced legislation entailing important consequences for British industry. All that was said to have arisen out of the fact that the Prime Minister of the day happened to have a toothache on that critical morning. Mr. Crump did not see how such a course of events could have been forecast.

In Egypt, during the war, he was taught a little of the Egyptian language, and the first thing impressed upon him was that every word had three meanings: (1) the original meaning; (2) the exact opposite; (3) some sort of camel. He remembered that at one of the Society's previous meetings on the subject of forecasting, a man said in course of the discussion: "I am a business man; if I read your forecast, either I believe it or I do not. If I believe it, I proceed to act upon it, and my action will set in motion a train of forces which will immediately upset your forecast." Mr. Crump could not help feeling that if sufficient people proceeded to act directly against Mr. Glenday's forecast, in pursuance of the old Stock Exchange maxim of going against the stream, they would by their counter-action set in motion such a series of forces as would make the forecast correct after all. These were all doubts of a psychological character; it was certain that the individual had to be taken into account in these matters, especially in short-run forecasts. When dealing with longer periods and with trends as opposed to cyclical or temporary fluctuations, he agreed that many of these difficulties could be smoothed out.

When Mr. Glenday was trying to relate the supply of money to the trend of business, he left out of account the velocity with which it was moving. Now, if there was anything in the quantity theory at all, the velocity of circulation was just as important as the supply of money, and he must say that Mr. Glenday had omitted from his cauldron one of the essential ingredients. Still, with all his personal doubts, he must pay tribute to Mr. Glenday for having done a valuable piece of work which was also stimulating in these times, and of the greatest use to the country.

DR. E. C. SNOW said that his interest in the paper was strictly practical and therefore related chiefly to the second part, but he would like to add his appreciation of the first part as well. He had followed Mr. Glenday's forecasts for some years, and considered him to be one of the relatively successful business forecasters. He would not, perhaps, give him full marks, but to get half marks in this difficult subject was rather an achievement.

Mr. Glenday started by saying that to the business man forecasting was a necessity. Some years ago he (the speaker) had interested himself in finding out how the actual business man did forecast, and he asked a friend of his, a leather manufacturer in the North of England, what influenced him in forming an opinion of the future of the leather industry. This man replied that from his office window he could see three large chimneys belonging to an iron and steel works. If two chimneys were smoking, he took it to indicate that things would be normal in the leather trade for some time to come; if three, that a boom in leather was about to start, while if one only was smoking a slump was to be anticipated. For some years past not one of the three chimneys had been smoking, and the leather people had had to devise another means of forecasting.

Dr. Snow said that when he first had to take a really practical interest in this subject he had read up a lot of the literature about it and had carefully followed the forecasts given by one of the chief American business forecasting organizations. The analysis made by the staff of this organization regarding the relative position of the movements in individual industries in the general trade cycle had apparently satisfied them that in pre-war circumstances the leather industry was the first to move in the trade cycle. At first he felt that this fact would be very useful to him, but on looking into the matter further he found that it did not help at all. There was little point in being the leader of a movement if one could get no guide as to when to start to lead. For the last ten years the organization in question, though it had continued its work, had not been able to demonstrate that this order of priority in the trade cycle persisted in post-war conditions.

Dr. Snow suggested that the analytical method of forecasting, co-ordinated with the method developed by Mr. Glenday, might lead to more helpful results than had yet been attained by either method separately. There was a mass of data which had not been analysed; the data provided by unemployment figures of various industries which were now available had not, so far as he knew, been analysed, with a view to determining the relationship between employment in different industries. Unemployment had not equal effect in all industries at the same time; some moved in front of others, and it would be useful to analyse the data available in this country to illustrate this point.

Dr. Snow said that, with a view to getting hints which would be useful to him in practical forecasting, he had studied the Federal Reserve Board Bulletins closely, and for three years he was very much impressed by the association between the open market operations of the Board and subsequent movements of hide prices. After three years he was rash enough to make some public reference to this association, but immediately afterwards the Federal Reserve Board let him down and he had not been able since to trace any correlation between their activities and the short-term movements of prices of the commodities he was concerned with.

Dr. Snow mentioned that the only other paper with the title of " Forecasting " in the Society's *Journal* was one of his own written six years ago, and upon looking it up he had been impressed with the great improvement that might have been made in it if he had used the philosophical methods followed by Mr. Glenday, in addition to the empirical methods he had himself employed.

Dr. Isserlis wished to amplify the point made by Mr. Yule, but would go a little further. It had been suggested by the author of " Why we sometimes get Nonsense Correlations in Time Series," and also by Professor Bowley, that the column containing Probable Errors should be omitted. He would like to suggest that it would be as well to omit the correlations themselves.

On p. 29, Mr. Glenday stated that on every occasion of a trade cycle fluctuation, a premonitory warning was given by a marked rise in the short-term rate curve relatively to the long. Mr. Hawtrey had dealt with the philosophical meaning of that, but as one connected with one particular industry, Dr. Isserlis felt he must so far have been an unfaithful servant to his industry, as he had always said that he was unable to tell in what particular phase of the cycle the industry stood. At the present day, so far as the shipping industry was concerned, he felt sure they were on the downward part of the cycle, but he could not tell at what stage they were of this particularly depressed movement. In this connection, he would like to ask the author if he seriously maintained the view expressed on p. 29, that it was possible to say at what particular stage of the trade cycle an industry had arrived, or even whether a new cycle was beginning? Was this sort of theoretical conclusion based on the conclusion stated on p. 29? If so, it would be wise to emphasize the warning that these correlations in time series, for which no one could give even an approximate estimate of the probable error, should not be stressed.

SIR WILLIAM BEVERIDGE said that it had not been his intention to take part in the discussion, but he would not like to go away without adding his tribute to the thanks offered to Mr. Glenday for his paper. He did not know if Mr. Glenday was at all disappointed in the discussion, but if so he would realize that the better or more valuable a paper was for the *Journal*, the less easy was it to discuss it at the meeting, and he felt sure everyone would realize that there was so much in this paper that they would want to study it at leisure.

Sir William shared the Chairman's feeling that Mr. Glenday's paper had not done quite what the title said it would do. The title was attractive to him, not because of the business forecasting, but because it was to be a "Quantitative Investigation of the Influence of Money on Trade Development." The author had started out admirably in theorizing as to what he thought money ought to do, and in the way in which he had set the problem. But in testing his hypothesis, Sir William (while not wishing to say a word against the fifteenth century and its statistics) felt that Mr. Glenday had taken too wide a sweep. He would have liked to see Mr. Glenday use the microscope more and the panoramic view less. When money was put into the economic machine it must be put in at some particular place, and what it did was quite different according to where it was put in. If Mr. Glenday would consider the effect of money in detail, according to the way in which it entered the economic system—and by "money" he did not only mean gold, but money of all kinds—and if he would use his enormous industry and ability to apply his microscope to the effect of putting in money at different stages of the productive process, he would confer a very great benefit upon economic statistics, and in so doing he would help those in the practical world.

The most serious criticism Sir William had to make was on the last paragraph of all. He hoped, however, that Mr. Glenday would realize that it was not meant to discourage him from going on with this investigation, but to encourage him heartily and in every possible way.

SIR JOSIAH STAMP, referring to Mr. Yule's suggestion as to the elimination of the column dealing with the probable errors in the coefficients, said that although this might be very desirable, he thought it would be going too far to adopt Dr. Isserlis's suggestion to omit the coefficients altogether, as, when any aspect of a paper had given rise to an interesting discussion, it would be unfair to suppress in the published paper the part that had led to the discussion. He thought Mr. Glenday should allow those figures of coefficients of correlation to remain if he would show whether they were the correlation of the terms which in a time series gave false values, or of the deviations from the trend or of first differences, when they might be quite useful.

The vote of thanks to Mr. Glenday, having been proposed and seconded, was now put to the meeting and carried unanimously.

Mr. Glenday, in reply, said: I should like to express my gratitude and appreciation for the very generous terms in which Mr. Hawtrey and Mr. Macrosty have proposed the vote of thanks for my paper. They have almost made me feel that it is unnecessary to offer an apology for my rashness in venturing into highly dangerous and speculative regions for which I am so ill equipped. At the same time I feel it my duty to say, that my only justification for succumbing to the suggestion that I should submit a paper to this Society is a certain scepticism in regard to current explanations of economic phenomena, born of some years' dealing, on the practical business side, with problems which have arisen from vagaries in the monetary flow and currency instability.

Let me make clear, however, that my audacity has not gone to the length of elaborating a new theory of the relations of money and trade. The tentative working hypothesis round which my paper has been cast is merely the framework for a plea that our monetary problems would be re-examined in a new way. I shall feel amply rewarded for the labour involved in preparing this paper if I have managed to stimulate the interest of some of those who possess the requisite statistical and economic knowledge to examine the various possibilities which I have sketched out; and so possibly lead to some additional light being thrown on the problems which are so confusing to those of us who spend our lives in the business world.

Briefly summarized, the purpose of my paper is to suggest that, instead of envisaging trade problems in terms of abstract theory, we should study them as causally connected events in the natural evolution of trade. In short, I recommend the adoption of the method which has been so fruitful in natural science—the study of Natural history. If the facts are approached in this way, I believe our present-day problems would appear in a new and simpler form. Trade cycles, for example, would no longer seem unexpected disturbances of the balance of some particular level of progress, but as the natural outcome of accelerations or retardations in the rate of progress itself. Traditional economic theory, with its static conception of equilibrium, cannot be directly applied to the dynamic problems of the moving system of business.

From the dynamic practical point of view, the suggestion that we should seek to eliminate trade fluctuations by a "stable price level policy," is analogous to implying that a permanent cure for sea-sickness should be sought along the lines of international co-operation in keeping the surface of the sea flat!

Sir Josiah Stamp seems to complain that I bring no new magic to the art of business forecasting. But in saying this he is, I fear, in danger of missing the main point of my paper, which is a plea for the abandonment of the traditional method of seeking for a magical explanation of economic phenomena and its replacement by the scientific method of investigating fact, with a minimum of theoretical or personal bias. Adopting his analogy, if, instead of watching the violinist, we would apply ourselves to a scientific study of the violin strings, we might, perhaps, hit upon discoveries as illuminating as those made in music when man first turned his attention to the scientific study of the actual production of sound.

My paper indicates that we might even hit upon almost precisely the same discovery, namely, that the outward and visible *transverse* vibrations produced in the instrument may be less potent than the hidden *longitudinal* vibrations of the actual sound waves themselves.

Sir William Beveridge has also inclined to misunderstand my purpose. If I may put it bluntly, I am suggesting that the orthodox method of viewing the relations of money and trade are so far out of touch with reality as to be incapable of providing a satisfactory explanation of economic experience. That the sterility of recent economic investigation is in part due to the application of its quasi-mathematical technique to the wrong abstractions. My paper hints that even the great "Quantity theory of money" itself may be untrue, except in such special cases as a "flight" from currency, or a swift inflation in time of war. These are grave charges. But even an eminent economist has written of orthodox economic theory that "much of the thinking in it was done more than 50 years ago." If there is any substance in my criticisms it may mean that we shall have to discard much of the existing material and start afresh. I gather that one of Sir William's own colleagues, Professor Hayek, inclines to this view. But Sir William does not indicate where he stands. Until, however, we are agreed as to the territory to be surveyed, it is surely unwise to bother about the details of the actual survey. In any event, it is surely more appropriate that a detailed examination of the kind he recommends should be carried out by the experts in the School of Economics over which Sir William presides, rather than by harassed business men like myself. To bring home to Sir William my difficulty with the traditional economic explanation, may I be permitted to employ an analogy.

The argument in my paper implies that many of the current concepts of economic theory are only figments of the imagination. They have no direct contact with reality. I am reminded of the sculptor Epstein, who complains that the public cannot appreciate his representation of *Night* because it persists in seeing *Night* as "a pretty lady with a sad face dressed in flowing black drapery." They believe in it so firmly that it has become a naturalistic conception. The same can surely very nearly be said of some of the more popular conceptions of economics, viz. "price levels," "savings and investment," "purchasing power parity"—even of "the quantity theory of money" itself. Curiously enough, Mr. Epstein's complaint has recently been almost exactly paralleled in economics through the action of Mr. Keynes in presenting in new garb two of orthodox Political Economy's most cherished "representations" viz.: "savings" and "investment." The controversy which has followed his action has, I fear, somewhat puzzled business men, who can in neither the old nor the new images find anything remotely resembling the actualities with which they personally come into contact.

Mr. Hawtrey has shown such a sympathetic appreciation of my problems that I am disinclined to quarrel with his elucidation of the specific queries he raised. Perhaps he will permit me, however, to enter one *caveat* and say that I am not certain whether I would accept the very clean-cut distinction which he seems inclined to draw between cyclical fluctuations and the long-term process of growth. Let me illustrate my difficulty by reference to the development of the motor industry which, by common consent, has played a major part in post-war industrial development.

In 1909, I understand, there were something like one hundred odd domestic makes of motor-car advertized in the United States. Of these, less than 20 are still on the market. In addition, there have probably been at least another hundred more recent manufacturers who have come into the industry and been closed down. During this period there were taking place changes in the methods of manufacture and design even more notable than those in organization. Before the war controversy ranged over such matters as make and break versus jump—spark—ignition; chain versus shaft drive; long stroke versus short stroke; petrol engine versus steam, etc. The following is a list of a few of the major changes in design in the past few years: —

1919. High power. Low revolution. Large Engines. 4 Cylinders standard.
1922. Lower Power. Increasing Velocity and Revolution. Smaller Engines.
1924. Introduction of 6 and more cylinders. Velocity reduced. Piston alloy replace steel. Increasing velocity and Revolution.
1926. Lower H. P. 4 Wheel Brakes. Vaccum servo brakes.
1927. Chromium plating supersedes Nickel. Nitrocellulose Pacquer—varnish. 6-Cylinders replace 4, as standard. Single oil jet lubrication in place of a series of jets.

Each of these innovations involved major changes in the "intermediate" products of the industry, and while maintaining the general structure of the original motor-car, in the long run transformed it in effect into a completely different article.

In addition to these changes, I would ask Mr. Hawtrey to look at the myriads of accessories associated with motor-car driving, and to the development of roads, garages and hotels which has gone to make what is often referred to as the "motor age." Now I find it difficult to isolate, especially in the post-war period, these industrial developments from among the causative factors in post-war cyclical fluctuations, especially that of 1924–1932. This does not mean I disagree with Mr. Hawtrey's emphasis on the industrial aspect of changes in the quantity and price of available credit. I believe that it is quite possible that during the 19th century fluctuations in prices of food and textiles (see Chart "C") may sometimes have been as active in promoting booms as disturbances caused by contemporary inventions, since these commodities in their harvesting and distribution may cause sudden fluctuations in the aggregate of banking credit.

As a second illustration of the part which changes in the rate of progress play in disturbing the even trend of trade even over short periods, let me refer to certain recent suggestions which have been put forward for dealing with unemployment by the State promotion of national development in housing, agriculture, electric supply.

To avoid being embroiled in political controversy, let me at the outset make it clear that my observations are not to be taken as criticisms of current policy, but simply as theoretical illustrations. Over the past decade we have as a nation markedly accelerated the rate of house-building. Bearing in mind the circumstances that our population is almost stationary, it follows as a necessary consequence that we must anticipate an abnormal slowing up in the normal rate during the next decade, accompanied by a slump in building and its allied trades. But this is not all. We are living at the beginning of a "concrete" age. Since recent houses have in the main been built of what seems like being an obsolescent material—brick, not only will contemporary builders be soon complaining that there is no alternative market abroad for their products, but looking ahead into the future—say, thirty years hence—we must expect the housing experts of the day to be found complaining that, owing to the acceleration of building in the period 1920–1930, the British people of their time are living in less up-to-date and convenient houses than if that acceleration had never taken place : that is to say, if our own generation had not interfered with the natural evolution, future generations would have had more concrete and less brick houses. Let us next imagine what would have happened if agriculture had also been thus artificially expanded and national funds applied, say, to restoring arable farming on pre-war lines. Surely such a policy might have led to something really disastrous for future generations; for we should have fettered our farming with the shackles of an antiquated technique at a time when methods of cultivation were being revolutionized in America and Canada by such changes as the creation of the 50,000-acre "factory farm" with its mechanized equipment and mass-production technique.

That this is something more than a mere flight of the imagination can be seen in the current agricultural difficulties of certain Continental countries.

My last example—electric supply—offers an instance of what at first sight seems a more hopeful "leap in the dark" in anticipating future lines of progress. Suppose we could be sure—which apparently we cannot—that electricity, for reasons of flexibility and cheapness, was to be the motive power of the future, then the dangers incurred in hurrying on its development now might be largely a matter of the high cost of basic equipment, which would obviously be dearer than if development were to be allowed to proceed at a slower rate. A writing down of capital cost at a later date, however, would provide an escape from that loss. On the asset side there would be the fact that we were first in the field with a new international need, and therefore could reasonably look forward to finding foreign orders to replace those at home once our domestic needs had been met. For, unlike the case of the brick houses, there would be plenty of backward countries coming forward with demands for electric equipment of the current type.

Now, while Mr. Hawtrey might allege that to use these apparently isolated examples as typical of the fluctuations in development of the industrial organism as a whole is arguing from the particular to the general, I am not sure that he would be right. It is, I believe, true that the human element in Society, through its various institutions and "nerve fibres,' does impose some sort of organized and linked control over our aggregate industrial activities, somewhat in the same way as our monetary organization imposes control in the financial sphere. A stimulus applied to one part of the trade organism for any length of time, can, I suggest, promote growth or induce resistance of varying degrees in practically every other part. When Mr. H. B. Butler, in his "Unemployment Problems in the United States," tells us that between 1918–1920 and 1921-1926 the average output per worker in the leading branches of American industry increased by nearly 35 per cent., while the total numbers of workers employed declined by 7½ per cent., we instinctively assume - and his industrial samples show we are right in assuming--that the figures give an average of the effect on the various parts of the American trade organism of the single pervading stimulus called "mechanical progress." The fact that an overdose of a particular stimulus (*e.g.* over-investment in a new discovery or country) may by disturbing the money stream cause a financial crisis which will lead to a timely halt being called in the communication of that stimulus, does not necessarily affect the proposition that the basic cause is non-monetary. It is, however, probably true that our monetary organization is responsible for giving to trade cycles their quality of rhythmic periodicity.

Mr. Crump, I fear, has attempted to saddle me with a dilemma of his own method of forecasting. My prime concern is with the secular trend of trade whose fluctuations can, I believe, under certain circumstances be forecasted ahead. I do not believe that the acts of isolated individuals—even Prime Ministers—can do more than alter the timing of those fluctuations—or possibly exert some influence on their magnitude. May I illustrate by a recent example? Early in 1929 I felt confident that an International crisis was sooner or later inevitable. But not until October of that year was I certain that the breaking-point was imminent. Even then I should not have been prepared to forecast the actual date beyond saying that it could not be postponed for more than three or four months at the outside. To prepare forecasts covering *definite* periods, be they months or quarters, I regard as a gamble. Much the same applies to pre-estimates of the magnitude of a particular slump. I thoroughly agree with Mr. Crump, that one must be very careful indeed, lest in forecasting one helps to bring about the very result one has foreshadowed. For this reason, one must be extremely circumspect in referring to one's own country. Indeed, it is more or less a recognized practice of forecasters deliberately to under-emphasize the consequences of any unfavourable influences on the trade of their own country to avoid discouraging foreign buyers from placing orders there.

Turning to general argument of my paper, may I be allowed to make one final point? This relates to the grave confusion which has arisen as a result of ambiguity in the use of the word *international*: an ambiguity for which I am disposed to blame much of the misunderstanding of our difficulties at the present time. It is commonly assumed as axiomatic that our objective should be to bind together the countries of the world into a common financial system by means of gold. This ignores the possibility that countries whose production and riches are advancing at different rates may need different monetary policies.

It is interesting to reflect that the same illusion which influenced our liberal political leaders in the years 1910–1914, and helped to precipitate the Great War, was probably responsible also for helping their successors to lose the Great Peace. At the root lies the failure to appreciate the fundamental confusion between the passive and static type of internationalism typified by what I may term—I hope without offence—the League of Nations idea, and the active and aggressive form of internationalism which provided the motive force of "international" trade during the 19th century.

This latter system, with its insistence on the maximum free play to individual initiative and enterprise, should, I suggest, be regarded primarily as the *British* system.

The other European countries which attached themselves to it, in order to participate in the benefits of the foreign markets which British adventurers had opened up, still in the main pursued independent national systems of their own.

France, with her relative scarcity of coal and iron, produced a people living by agriculture, with an almost feudal attachment to the soil, self-contained, preferring old ways and investment in safe domestic securities. In short, France, with her stationary population, had practically achieved the Economists' ideal of stability.

The German Empire, with her linking up of the strong city traditions of politically independent States at a time when the exploitation of her coal and iron resources was encouraging industrial ideals, fostered a system of nationally planned economy. The stability of this National plan was disturbed by the need for markets outside her frontier to provide outlets for industries rapidly expanding under the stimulus of new gold.

The U.S.A., which developed by expanding along the lines originally laid down by the earlier British adventures and investors, had, by 1914, brought into being a vast homogeneous market, where differences in tastes, fashions and traditions had not yet had time to crystallize, despite the existence of a large number of apparently independent States. Here, but for the war, might have been achieved another stable and self-contained system.

The other new countries being opened up during the period, however, such as Canada, Australasia and South America, were still a long way from either maturity or stability.

The association, *for a time*, of these highly diversified systems in one common international monetary arrangement was probably one of the most remarkable economic achievements of the nineteenth century.

The war shattered that co-operation possibly beyond recall. Perhaps a breakdown was in any event inevitable. The plethora of new gold which had encouraged that temporary association may have merely concealed the underlying disharmony and been an indirect cause of the outbreak of the disrupting war itself.

The pre-war international arrangement, therefore, afforded no firm assurance that the world had reached a stage in its evolution when it was possible to make a *single* monetary policy suit all of a different number of countries, differing in stages of development and evolution, enjoying different standards of living, and, most important of all, with real production advancing at different rates. Nor that the time was ripe for the adoption of a *universal* standard of value for the adjustment of debts of all kinds. For with the pre-war surfeit of gold it was possible to combine its use as the basis of currency in the British *complementary* system of international trade with its employment as a means of accumulating treasure in countries outside that system; without one use interfering with the other.

Perhaps with the passing of the moral fatigue of our time and the revival of nature's agelong scheme of intertribal rivalries, with its eternal competition which is the price mankind must pay for progress, the " golden calf " will be dethroned from the seat to which it has recently been elevated to act as the arbitrator for debts of all kinds, and the universal standard of value. Gold may resume its more primitive functions of providing a means of storing accumulated treasure, and acting as an earnest of good faith in undeveloped countries with insecure monetary systems. Apart from this its function may be confined to acting as a lubricant in a world of self-contained intertrading groups each with its own managed currency, but only transferred outside its native group for the discharge of special debts between the different currency groups, and external obligations of a *non-trading* character. It may be found that *trading* debts, between countries, except within narrow limits, can only be settled without causing a disturbance of orderly progress, if they form part of a deliberate plan of *complementary* development between those countries. Thus the regulation of the interflow of production and consumption may displace the " stabilization of prices " as the central preoccupation, and an index of what I may perhaps term the natural *real* rate of interest (*i.e.* the rate of profitability of enterprise as determined by productivity) replace the "price level" as the guide to stability. In many Western countries the old are dreaming of stability, the young are once again on the move; midway stand the middle-aged or war generation many of them obsessed with an almost Lawrence-like sense of frustration - watching and wondering whether the entrenched position of the organized ranks of the former will carry the day against the passionate yearning to fulfil themselves in the activity of living of the circumscribed and diminishing numbers of the latter. Intently watching this struggle are the yellow and brown races of the world, just entering into the promised land of industrialization.

The old lady of political economy takes small account of these deep-seated sources of unrest or of the economic disturbance by new invention of the sensitive balance of nature, with its delicate system of checks and counterchecks. Nor should we hasten to blame her. Born in a period of scarcity and want and nurtured over long ages when development was either sluggish or absent, it is not surprising that she has inclined to a housewifely preoccupation with matters of national book-keeping, with its problems of the relations of exports to imports, general price levels and the various types of trading accounts. It is natural also that this preoccupation should lead her to picture Utopia as the perfectly balanced account—stability. But to her children, whether in the business world or outside, who were not book-keepers, but rather adventurers, the stability which to her is the final goal seems to be but the starting-point for a new adventure. For over four hundred years enterprise has been landing at the shores of Utopia, and setting sail again.

Note on Statistical Table in Foot-note on page 29.

I owe an apology for the original inclusion, without explanation, of the "probable errors" in the table of correlations now given in the foot-note on page 29.

I should have made it clear that the table as a whole was merely included to whet the appetite of statisticians! It was not my intention that it should be regarded as a completed investigation. Unfortunately neither Mr. Please nor I have had the necessary time or leisure. The table is merely a rough "Laboratory note" for the assistance of future investigators. Although I have, in deference to the suggestion of certain speakers, excluded the "probable errors" in the finished proof, I should like to make it plain that I do not regard even the correlations themselves as finally establishing in their present form definite causal relations. But they do, I suggest, afford evidence of the existence in some degree of the interdependence *previously* indicated by the analysis and logic of the argument developed in the paper itself. I may add that certain standard deviations which were worked out also point to a high degree of agreement. To a large extent I share Dr. Isserlis's distrust of the use of mathematical formulæ in statistical investigation, but I think he goes much too far in his pedantic insistence that we should abolish the statisticians' yardsticks completely. He is in danger of falling into the major logical fallacy of arguing that because *some* correlations are nonsense, *all* must be. My own view is that in this matter we should follow the lead of the Natural Sciences.

As a result of the ballot taken during the meeting the candidates named below were unanimously elected Fellows of the Society:—

Faridon Pharos Antia, M.Com., Ph.D.Econ.
Rowland Ewart Beckett, F.L.A.A.
Hariprasad Chaudhuri.
George Metcalfe Collier.
Mahmoud Mohemmed el-Darwish.
Karl Edmonds.
Ronald Gustave Kellett.
D. M. Manasvi.
Humphrey C. B. Mynors.
Francis Peach.
Alexander Sachs.
Katie Charlotte Smith, B.A.
Soren Sorensen.
James Whitehead.
Miles de Wachenfelt.

Corporate Candidates

Sydney John Endean-Rowe, *representing* the Hull and East Riding Economic League.
John Frederick Archibald Porter, *representing* Saward Baker & Co., Ltd.

THE BALANCE OF TRADE.

A Discussion, opened by DR. E. C. SNOW, M.A., at the meeting of the Royal Statistical Society, December 15, 1931.

[The PRESIDENT, SIR J. C. STAMP, G.B.E., LL.D., D.Sc., in the Chair.]

MY contribution to this discussion on the Balance of Trade will be limited to two points in connection with the commodity side of the problem—the visible imports and exports. I doubt whether I could make the points intelligible, however, without the use of some statistical tables, and I have taken the opportunity of putting these into print. It would probably be convenient also for later speakers to have a record of the National Income and Expenditure Account of recent years. This may be arranged in the following form :—

Balance of Income and Expenditure in the Transactions (other than the lending and repayment of Capital) between U.K. and all other countries.

£ million.

	1924.	1925.	1926.	1927.	1928.	1929.	1930.
DEBITS.							
Imports of Merchandise ...	1,277	1,321	1,241	1,218	1,196	1,221	1,045
Net Imports of Bullion ...	—12	—10	12	3	6	—16	5
Total	1,265	1,311	1,253	1,221	1,202	1,205	1,050
CREDITS.							
Exports of Merchandise ...	941	927	779	832	844	839	658
Overseas Investments ...	220	250	285	285	270	270	235
Shipping Income	140	124	120	140	130	130	105
Interest and Commissions	60	60	60	63	65	65	55
Other Sources	—10	4	19	16	30	39	36
Total	1,351	1,365	1,263	1,336	1,339	1,343	1,089
Credit Balance ...	86	54	10	115	137	138	39

The source of this statement is the annual article on the Balance of Trade published early each year in the *Board of Trade Journal.* For the benefit of those who have the impression (perhaps to some extent justified by the use of the title "Balance of Income and Expenditure") that the statement possesses the exactitude associated with accountancy, it will be well to quote the opening words of the article in the *Board of Trade Journal* in February last: "In the following article *an attempt is made to estimate* the net balance on all transactions of a revenue character. . . ." At the present time it seems particularly desirable to emphasize that a statistician in handling this problem, while doing his best, is very seriously handicapped by the inadequacy of his data.

The excess of our commodity imports over exports in the twelve months ending November 30th this year (which I will subsequently refer to as the figure for 1931)* was £416 million. The debit balances on commodity account compared with the credit balances on the total account in the past few years have been as follows :—

	Debit Balance for Commodities.	Total Credit Balances.
	Million £.	Million £.
1924	336	86
1925	393	54
1926	462	10
1927	386	115
1928	352	137
1929	382	138
1930	386	39
1931	416 [409]	

It has been frequently stated on political platforms in recent weeks that the missing figure at the bottom of the last column will be — 100, but no doubt most people in this room will prefer to wait for the publication of the official figures in a couple of months' time, and I have left the space blank.

The fact that the excess of commodity imports over exports for 1930 showed such a small increase on that of 1929 has led to various expressions of satisfaction at the way we have been weathering the world-wide slump. In the Macmillan Report, published in June last, at the end of two paragraphs comparing the trade figures of 1930 with those of 1929, this satisfaction was expressed in the words, "We conclude that the underlying financial facts are more favourable than had been supposed, and that Great Britain's position as a creditor country remains immensely strong." Sir Wm. Beveridge, writing in November on the same point, said, "We are threatened by a negative balance of trade, not because our exports have fallen more than imports (they have not), but because our shipping is not being used, and because producers in other countries are depressed and cannot pay us what they owe." I think that a more complete analysis of the data does not support the statements quoted, and that their wide circulation has lulled many people into a sense of confidence in our national economy which is not justified. If we applied the same criterion to other countries

* Since the meeting the figures for the calendar year 1931 have been published and, where appropriate, these have been added in square brackets [ ].

we should conclude that most of the commercial nations of the world have similar cause for composure regarding their trade balances, yet few of them have been able to refrain from drastic action in controlling imports. The excess of commodity imports over exports for a number of countries in 1928, 1929 and 1930 was as follows :—

Excess of Commodity Imports over Exports.

		1928.	1929.	1930.
Germany	Million Marks	2,390	780	– 940
Australia	,, £'s	2	22	4
Austria	,, Schilling	1,030	1,060	850
Belgium	,, Francs	1,100	3,650	4,670
Canada	,, Dollars	– 130	110	120
Denmark	,, Kroner	100	100	120
Spain	,, Pesetas	890	620	150
United States	,, Dollars	– 950	– 820	– 660
Finland	,, Marks	1,770	570	– 160
France	,, Francs	2,060	8,080	9,520
Greece	,, Drachmæ	6,340	6,290	4,930
Hungary	,, Pengo	400	30	– 80
British India	,, Rupees	– 810	– 720	– 650
Italy	,, Lire	7,360	6,460	5,210
Japan	,, Yen	220	70	80
Norway	,, Kroner	340	320	380
New Zealand	,, £'s	– 10	– 5	– 1
Holland	,, Gulden	700	760	700
Poland	,, Zloty	850	300	– 190
Portugal	,, Escudos	1,650	1,450	1,470
Sweden	,, Kroner	130	– 40	100
Switzerland	,, Francs	610	680	900
Czecho-Slovakia	,, Crowns	–2,010	– 540	–1,790
Yugo-Slavia	,, Dinars	1,390	– 330	180

* The figures, which are approximate only, are based on the monthly average figures of imports and exports given in the monthly Bulletin of Statistics of the League of Nations.

Except for France and Belgium (special cases) nearly all the countries having a substantial excess of imports over exports reduced that excess between 1928 and 1930, and in some cases an excess of imports in the earlier year was turned into an excess of exports. If the fact that during a period of unprecedented slump a country is able to prevent its commodity import surplus from increasing is a matter for satisfaction, it would seem that most of the trading countries of the world have cause to be satisfied, many of them to an even greater extent than ourselves. In view of the general paralysis which has crept over world trade, this seems to be such a paradoxical conclusion that it is well to look for a source of fallacy in the argument.

The following table analyses the British figures of excess of commodity imports over exports into (*a*) Class I (Food-stuffs), (*b*) Class II (Raw Materials), and (*c*) Class III (Manufactured Articles) :—

£ million.

	Class I.	Class II.	Class III.	All Articles.
1924	484	217	−353	336
1925	483	250	−328	393
1926	453	271	−250	463
1927	460	204	−266	386
1928	449	198	−287	352
1929	454	206	−268	382
1930	403	148	−157	386
1931	366 [361]	102 [101]	− 45[−46]	416 [409]

Between 1929 and 1930 we reduced our import surplus for Food-stuffs by £51 million, and for Raw Materials by £58 million, but these reductions were more than swallowed up by the adverse change of £111 million in Manufactured Goods. Between 1930 and 1931 we still further improved our position in Food-stuffs by £37 million and in Raw Materials by £46 million, but again these reductions were more than counterbalanced by the adverse change of £112 million in Manufactured Goods.

Features more or less similar to these are to be noticed when analysing the figures for other countries. In dealing with the figures for a relatively homogeneous group (Food-stuffs alone, or Raw Materials alone, or Manufactured Goods alone), a substantial decline from year to year in the past few years is obvious, and this, of course, arises from the decline in prices. But when groups showing a declining import surplus are combined with a group showing a declining export surplus, we get a result of which the meaning is hidden, because it depends upon the relative importance of the two groups. As imported Food-stuffs and Raw Materials are so very important in our national economy we should surely have expected that the import surplus would have declined considerably in the past two years. From the point of view of the maintenance of the stability of sterling, I see no cause for satisfaction at all in the fact that our surplus of total imports which stood at £381 million in 1929 was practically unchanged in 1930, and only £30 million worse in 1931. On the contrary, it seems to be a reason for considerable alarm that the import surplus did not decline substantially in a period of such startling fall in prices. If we have not been able to profit in the period of falling prices by actually reducing our total import surplus, what state shall we be in when prices rise again? I will return to this point in a moment, but I feel that the aggregation of the figures in the way which has been customary for many years past has been the means of hiding some important truths, and in misleading us as to the true position. There is no special virtue in the procedure by which we add up the figures for Food, Raw Materials and Manufactured Goods, and compare the aggregate with corresponding figures for Shipping Income and Investment Earnings. It is probably more logical, in dealing with the Balance of Trade problem, to add together the figures for Food and Raw Materials alone, these providing a measure of our consumption or requirements of imported goods, and to compare the total with the aggregate of those for Manufactured Goods and Shipping Income together, these two being a measure of our production and transporting services available to pay for the imported articles. It is perfectly proper, of course, in the Customs classification to combine the figures for Manufactured Goods with those for Food-stuffs and Raw Materials, but this should not tie us to the same procedure when we are dealing with an entirely separate problem. I suggest that we see our position more clearly if we set out the figures for the past three years as follows :—

	1929.	1930.	1931.
		Million £.	
What we received.			
Excess Imports of Food-stuffs and Raw Materials	660	551	468 [462]
Our means of payment.			
Excess Exports of Manufactured Goods (including parcel post)	278	164	52 [53]
Shipping Earnings	130	105	[illegible]
Overseas Investments	270	235	[illegible]
Interest and Commissions	65	55	[illegible]
Other Sources	55	31	[illegible]
Total	798	590	

This statement brings out clearly how great has been the decline in the value of what we have received and how great also has been the change in our manner of paying for it. Any steps which are contemplated for remedying the adverse Balance of Trade should separate the "receipts" side from the "payments" side. After paying for the imported Manufactured Goods our exports of Manufactured Goods contributed only £52 million towards the £468 million of Food-stuffs and Raw Materials we have to import.

The matter can be looked at from another angle by examining the figures which would have represented the import and export surplus for the various classes if there had been no change in prices since 1924. It is possible to do this by means of the data now provided every quarter by the Board of Trade, showing what would have been the value of imports and exports if the quantity had remained the same, but the prices had been those of 1924. The figures are as follows:—

Import Surplus on assumption that Prices had been constant since 1924.

(Million £.)

	Class I.	Class II.	Class III.	Total of 3 Classes.
1924	484	217	−353	348
1925	477	250	−329	398
1926	474	327	−265	536
1927	495	268	−304	459
1928	487	232	−322	397
1929	498	257	−316	439
1930	510	236	−181	565
12 months to Sept. 1931 ...	551	226	− 70	707

It would appear that we have imported much more food this year than has been necessary to maintain the same quantum of consumption as in previous years. We probably could have saved £40 million on imported Food-stuffs without serious inconvenience. The Class II figures call for no special comment, but the Class III ones are startling. The surplus of export of Manufactured Goods this year is both by value and quantity only about one-fifth of that of 1921. The expectation that the depreciation of sterling by itself is going to reduce importation of Manufactured Goods and increase exports may take a longer time to realize than is generally expected. It certainly has the tendency to do so, but the difficulties in the way of getting other people to accept or, at any rate, to pay for the goods we can now make so much cheaper in gold than a few months ago becomes greater from day to day. Cheap production is not at present the prime factor in developing the export trade of this country.

Does this analysis enable us to make a forecast of the import excess in the near future? Though the problem bristles with uncertain factors, I think the dissection of the figures into the three classes does enable us to see the future better than we see it through the examination of the combined figures alone. Although we get a good proportion of our Food-stuffs from countries not on the gold standard, it seems improbable that the sterling prices of our Food imports in 1932 will not be higher than in 1931, and the same may be said of our Raw Materials. It is reasonable to assume, therefore, that the excess of imports of Food-stuffs and Raw Materials in 1932 will show an increase on that of 1931 (£468 million), With more than twenty countries already restricting imports by means of control over foreign exchange, it is extremely difficult to see how we can make this up by increasing exports of Manufactured Goods. A more detailed analysis (involving particulars of the proportion of our Food-stuffs and Raw Material imports coming from "gold" countries, in comparison with the proportion of our exports going to "gold" countries) would be necessary to get any reliable estimate of the effect of the depreciation of sterling on imports and exports, but it may be pointed out that 20 per cent. of the value of our retained imports of Food-stuffs and Raw Materials in 1931 was £111 million, and it would require an increase of 40 per cent. in the value of the exports of our Manufactured Goods to counterbalance this (assuming no change in the *value* of the imported Manufactured Goods). The actual figure for 1932 will be affected by the extent to which restrictions are practised, but under conditions as they are at present, I am inclined to the view that it would be prudent to expect an even greater adverse balance in commodity trading in 1932 than in 1931.

Before turning to my other point, there is one matter which may be of interest to record. I have made an analysis of the figures of the export excess of Manufactured Goods by using Table IV in the "Statistical Tables relating to British and Foreign Trade and Industry, 1924 to 1930," published at the end of last year. In this table the figures of the imports and exports of Manufactured Goods are further subdivided into (1) Articles ready for consumption, (2) Articles manufactured but requiring adaptation or combination, and (3) Articles partly manufactured. From this Table the following has been prepared:—

Excess of Exports of Manufactured Goods.

(Million £.)

	Articles ready for consumption.	Articles manufactured but requiring adaptation or combination.	Articles partly manufactured.	Total.
1924	127	211	15	353
1925	123	192	13	328
1926	102	146	2	250
1927	109	151	6	266
1928	129	151	7	287
1929	123	141	4	268

It would appear that it is not in the fully Manufactured Goods ready for consumption in which we have lost ground, but in those articles which are used in some form or other by industry itself.

My second point relates to the error which is involved in assuming that the published figures of imports and exports truly represent the payments made and the payments received in this country for the imports and exports respectively. The Customs instructions to importers and exporters are as follows: (1) " In the case of goods which are invoiced at a quoted price the value to be stated in this entry should be the prime cost with freight and insurance added (' c.i.f.' value) "; (2) " When the goods are consigned for sale, the value to be given should be the latest sale value of such goods." In the case of exports, the instruction is simply " the ' f.o.b.' (or free-on-board) value should be given."

Having myself raised many points with the Customs authorities in the past few years regarding the returns made in connection with individual imports and exports, I am quite satisfied that the officers concerned do their best to ensure that the instructions are properly complied with, but this does not ensure that the value of an imported article, as stated to the Customs, is necessarily the amount remitted out of the country in respect of it, or that the Customs value of an article exported is necessarily the amount received in this country for it. The question of time lag between Customs returns and payment for goods is possibly more important now than in past years. Our imports are paid for generally more promptly than our exports, and the tendency is to increase the length of credit on exports. In comparing the final figures for one year with those of another, there is probably not a great deal in this point, but a much more important matter is the fact that frequently the value stated on the Customs entry is not even the amount *ultimately* remitted to or from the country. It seems impossible to discuss this on general grounds, but many illustrations can be given.

First of all, with regard to consignment goods, which constitute a substantial proportion of our foreign trade. In the case of imports the importer is required to return " the latest sale value." On a falling market it is extremely likely that the return made to the Customs is above the amount actually obtained and remitted out of the country, while on a rising market the reverse is likely to be the case. A considerable proportion of the goods imported from Russia in recent years, for example, has been on consignment, and although the returns have no doubt been properly made, I think it quite likely that the amount of sterling actually received for these goods is appreciably below the recorded value of the imports. In the case of goods exported on consignment, similar considerations hold. The exporters make their returns to the best of their ability, but on a falling market they may have to let their goods go at a loss, and the amount ultimately received in this country for them may be well below the value recorded by the Customs. On the other hand, on a rising market they probably receive more than the Customs entry indicates. Most trades could probably provide concrete examples on this subject.

In the case of imported goods invoiced here there is a great variety in the actual methods of remitting the money abroad. One extensive class of case is represented by the import of rubber, and I will illustrate this in some detail. The statement below compares the position in 1925 with that in 1930 and 1931. The first line shows the value of the imports and the second the average value as declared to the Customs. A considerable proportion of the imports are re-exported, but as the average price of the re-exports is approximately the same as that of the imports, the position is not affected by the fact that some of the rubber coming into this country goes to, say, an American customer rather than a British customer. The third line shows the approximate "all-in" cost, *i.e.* the amount which has to be remitted from the proceeds of the sales of rubber in this country for the upkeep of the plantations and selling expenses. As the statement is not intended to be an exact one, but only for illustrative purposes, I have not gone to great trouble to find out the true average "all-in" costs, but have used approximate figures employed in articles on the rubber industry in the *Economist*. The fourth line shows the approximate amount remitted abroad out of the value received for the imports, and the last line shows the difference between the import value and the amount remitted out of the country :—

Imports of Rubber.

	1925.	1930.	Jan.–Oct. 1931.
Gross Imports £(000)	27,839	10,274	3,753
Average declared price	34*d*. per lb.	6·3*d*. per lb.	3·6*d*. per lb.
Assumed "all-in" cost, *i.e.* amount remitted	9*d*. per lb.	6*d*. per lb.	6*d*. per lb.
Amount remitted £(000)	7,400	10,000	6,250
Difference between Import Value and amount remitted £(000) ...	−20,400	small	+2,500

I wish to place no stress on the actual figures, but merely to point out the difference in the final figures for 1925 and 1931. In 1925 the import figure was substantially in excess of the amount remitted, while in 1931 it was below. (A certain amount of the rubber imported into this country comes from non-British plantations, but even if we confined the illustration to rubber from the Straits Settlements and the Malay Straits alone, the difference in 1925 between the declared value of imports and the actual amount remitted was about £12 million.)

The circumstances of many other commodities are to some extent similar in this respect to those of rubber—tin and other metals, certain tanning materials, wool, meat, etc.—but in these cases the facts are much more difficult to unravel. A substantial part of the importation in each case comes from British-owned property and the amount remitted from this country is not necessarily the declared value of the imports coming from them, but is the amount required to keep them in proper working order. In these other cases, however, there are also substantial imports into this country from non-British property and no quantitative illustrations can be given. In the aggregate as between a year of high prices and one of low prices, the difference between the declared value of the imports and the payments remitted from this country must be substantial. This difference, of course, represents profits on our overseas investments and presumably is directly brought into account on the credit side of the balance-sheet. Its appearance also on the debit side means that in a year of high prices the final figure on the credit balance (*e.g.* £115 million in 1927) is likely to be an under-statement of the amount of the credit, and in a year of low prices the corresponding figure (*e.g.* the reported deficit of £100 million for this year) is likely to be an under-statement of the amount of the debit.

Another illustration of possible error involved in assuming that the declared values of the imports represent the money remitted abroad, arises in connection with the method by which freight is paid. In some cases the importer remits abroad the whole c.i.f. value of the goods, and this may be the same as the figure returned to the Customs. In others, however, he remits the cost and insurance and pays the freight on this side. In other cases he pays also the insurance on this side. It may be that the method by which the item for shipping income (see first table) is calculated is able to take into account the difference between the two cases, but as the procedure varies from time to time we might find, if we had the data to examine, that the balance is affected in one direction in certain years and in the opposite direction in other years. There are innumerable variations in the methods by which import business is conducted. I have personal knowledge of a case in which a firm in this country bought equal quantities of the same class of goods from three different importers. The purchases were made on the same day at the same price and the goods shipped on the same boat. The three importing firms made the same return to the Customs authorities, but the amounts remitted overseas varied widely in the three cases.

These considerations apply even when exchanges are relatively stable, but they probably have a much more important influence when exchanges are unstable, as in the past year or two in the food and raw material countries—Argentine, Australia, Brazil, etc.—and generally now that sterling is unstable. The matter has now become extremely complex, and under existing circumstances when there is a substantial change in sterling between the time of entering into a contract and the time of completing the shipment, the error in assuming that the Customs import value is the same as the amount sterling (or its equivalent) remitted abroad may be substantial.

The same principle applies in the case of exports, and a good illustration has recently been made public in connection with the building of the new Sydney Harbour Bridge. The materials for this have been sent overseas in the past few years, and no doubt when they were exported their value was returned to the Customs officers at a figure based on the contract price. It is now known that very heavy exchange loss was incurred in remitting the money to this country, so that the amount of money received by us as a result of this export was substantially less than appeared from the trade returns. Many company reports of trading concerns issued in the past few months have contained references to the losses which have been incurred in connection with foreign exchange. These losses are a measure of the extent to which the Customs entries differ from the true amount received for goods exported. A considerable quantity of goods has been exported from this country in the past few months to countries which now control the foreign exchange purchases of their nationals. In some cases the sale of currency in the country of the customer is prohibited altogether and the British exporter has had to open an account in that country and hold its currency there until such time as the embargo is lifted. The time lag between the day of export and the day of receipt of money for it is, therefore, tending to increase, and this again renders the Customs figures less reliable as an index of the money being received from abroad for our commodities.

Illustrations of the shortcomings of the Customs figures as a measure of the money remitted to or from this country could be multiplied, but it seems impossible to get any comprehensive idea of the magnitude of the error. There will certainly be a great deal of cancelling out between the various errors, but there will equally certainly be a residuum left after all the cancelling is done. As suggested already, I am inclined to think that if we had accurate data we should find that the residuum is in the direction of causing the published figure of our debit balance on commodity account to be above the truth in periods of active trading, and below it in periods of depression. In any case the fact that we must recognize that there is such residuum is sufficient reason for introducing a margin of error in the Customs figures when these are used in discussions on the Balance of Trade. Our retained imports in 1930 were £958 million and our exports were £570 million. When used in discussions on the Balance of Trade, I suggest that these should be written, £958 ± i and £570 ± e, respectively. If the errors are only 1 per cent. the figure for the payments of imports would lie between £948 million and £968 million, and for the exports between £564 million and £576 million. The adverse balance of commodity payments, therefore, instead of being taken at £388 million would lie between £372 million and £404 million. If the margin of 2 per cent. error is used, the limits of the adverse balance of commodity payments would be £358 million and £418 million. Working on a 2 per cent. margin of error, if there are no errors in the items for shipping and investment which tend when combined with the commodity item to cancel the error in it, the figure of £39 million for the final balance on income and expenditure account in 1930 should be read £39 ± £30 or between the limits of £9 million and £69 million. Those who wish to be cautious and act conservatively in connection with our balance of payments will find justification in my opinion for taking our credit balance last year as low as £10 million, but one who has a motive for putting the figure high may be able to discover some grounds for taking it at £70 million.

Until recently the statement of national balance of payments was of academic interest only, and Sir Robert Giffen, who first made estimates on the lines of those published annually by the Board of Trade, would no doubt have been greatly shocked if he had known that they were likely to be used as a basis of high policy. The estimates served their purpose admirably when it was of no great practical concern whether our knowledge concerning the final credit balance was accurate. If the actual balance on revenue account is somewhere between £150 million and £200 million it is of no special importance that our methods of estimation should be able to determine the figure within an error of only one or two million pounds, but now that we recognize that on income and expenditure account we have certainly passed from the positive credit side to the negative, and that vital issues depend upon reducing the negative balance to small dimensions or turning it back again into a positive one, an entirely new method of measuring the balance seems to be called for. This matter was touched upon in the Macmillan Report. Compared with the task of getting particulars of their production from thousands of manufacturers through the Census of Production, the task of obtaining particulars of the foreign payments and receipts from the relatively few banks and finance houses doing foreign business seems a light one, and in view of the national urgency of the matter, some explanation why this course has not been taken seems to be called for. In the score or more of countries in which control over purchase and sale of foreign exchange has been effected the information is no doubt automatically forthcoming, but the vital importance of the subject in this country makes it extremely desirable that the information should be systematically collected, and that we should not in a national crisis be left to base great decisions upon a series of estimates worked up from inadequate data.

My points can be shortly summarized: (1) the data on which the estimate of our balance of payments is made are inadequate; (2) as compared with the figures for 1927 and 1928, I consider that the true decline in our credit balance for 1930 and 1931 is greater than is indicated by the official figures; (3) if the volume of our imports and exports in 1932 remains approximately the same as in 1931, the adverse balance of payments on our commodity account will increase.

DISCUSSION ON THE BALANCE OF TRADE.

PROFESSOR GREGORY: I like to open a discussion on a paper with which I am in such complete disagreement as the present one, because in such a case one is able to put one's own point of view much more clearly than when dealing with a paper with which one is in part agreement. I do not agree with any part of this paper, not because I question the statistics of so eminent a statistician as Dr. Snow, but because I question entirely the economic theory upon which the paper is constructed. But before I explain why I distrust the economic theory, let me quarrel with one question of fact.

On p. 77 Dr. Snow says that certain unfortunate remarks of Sir William Beveridge have allowed the country to get into a false sense of security. I cannot imagine anything more grotesquely untrue. What has actually happened is that from the Government down to the man in the street, we are all walking about terrified by a phantom; in fact, violent revolution in the fiscal policy of the country is being justified on the ground that it will help to restore the "balance." It is really quite untrue to say that the public is being lulled into a false sense of security. I should say the concentration of interest in this country on the Trade Balance is leading the public away from the discussion of the really vital aspects of the situation.

I am not being unduly optimistic if I venture to question Dr. Snow's statements, because I believe there are serious grounds for being pessimistic about the future. But Dr. Snow has tried to prove, quite unsuccessfully, that our balance of payments does not balance. I would begin by pointing out that if there is anything in economic theory at all, then the balance of payments always balances, and the really important question is the way in which it is made to balance, and not the quite stupid play upon words contained in the sentence that the balance of trade is inadequate. I suggest that the problem of balancing the balance has been made enormously more easy by the fact that we have departed from the gold standard; it does not now matter how low the rate falls. We should make a great mistake if we were to attempt to keep sterling higher than the necessary point at which the balance of payment would automatically be made to balance. We can make the balance balance more easily without imposing import duties at a time when we are off the gold standard than by imposing them, because if import duties are imposed, the effect would first be to raise sterling, and that would affect exports adversely as it affects imports favourably.

Is there anything really terribly frightening about the fact that in the last year, according to Dr. Snow, our adverse balance of trade on *commodity* account was not met? One of the great difficulties contained in the standard method of dealing with the statistics of the balance of payments, is that the most important item, the balance of capital transactions, always appears as an after-thought. I put it to Dr. Snow and to this gathering, that if there is a world depression and not the same necessity for export of capital as before, is it not reasonable that there should be an increased surplus of commodity imports? A larger proportion of national income than before is being drawn back, because so much is not being saved and reinvested abroad. Given a high standard of living, such as that of this country, I am not at all surprised that we have a larger surplus in commodity account than we had. I see no reason to be alarmed at all. I have enough confidence in the general tradition of English economic theory to assure Dr. Snow that the balance of payments in the end will balance, either because exchange will fall, which would stimulate exports, or because our imports will decline.

I agree with Dr. Snow that there is some reason to suppose that our visible adverse balance of commodity account will be at least as large next year as it is now, but I am not surprised that that should be so. If we were to start keeping the national accounts in pence, and made the unit a penny instead of a pound, would anyone be surprised that the imports and exports would be two hundred and forty times as large as they were before? Of course we must accept a larger numerical adverse balance if we let down the gold value of the pound, but there is no reason to be frightened by that.

Now I come to the points which really do frighten me about the situation. The chief point giving cause for alarm about the British situation is not that our balance on commodity account continues to be as high as it is, but that if the world goes on as it does at present, we shall not have a balance at all. We have really been financing ourselves partly by borrowing short, partly by using our income from shipping services and foreign investments to meet the cost of food-stuffs and raw material. If all the raw material countries of the world are going to default in the next twelve months, and

British shipping does not earn as much next year, undoubtedly the British national income is going to suffer, and under these circumstances there will inevitably be serious decrease in raw materials imported. What I am afraid of is exactly the opposite from what Dr. Snow fears.

I am afraid we are beginning to face the time when there should be alarm because of the decline in the total purchasing power of the British people, and I suggest that we as economists and statisticians should be much more seriously occupied with the question of what we are going to do under those circumstances than with the balance of trade. If we have an income the balance of trade will always look after itself.

MR. H. D. HENDERSON: I came here with certain rather dull and detailed comments to make upon Dr. Snow's paper. I find myself now under a strong temptation to ignore Dr. Snow altogether, and enter into a controversy with Professor Gregory, who has put before us various challenging propositions, some of which surprise me very much. I think, however, I had better not allow myself to be diverted, but, while perhaps dealing with Professor Gregory incidentally, to say what I have to say about Dr. Snow's paper first.

The paper falls into two parts; one part is devoted to criticism of the adequacy of the statistical data upon which the Board of Trade estimates the balance of trade, and the other part to a discussion of how seriously we should regard the balance of trade position. Under the first of these headings I have some criticisms to make. I think most of Dr. Snow's complaints about the accuracy of the figures from which the estimates are compiled miss their mark, because they seem to me to ignore what is after all the avowed purpose of the estimates, viz. to measure and estimate payments on income as distinct from capital account. We all realize, of course, that the fluctuations of the foreign exchanges at any time may be dominated by capital movements of various kinds, but the Board of Trade estimates frankly do not attempt to estimate those factors. None the less, to know the balance of payments on income account is a very important piece of information, because there is a fundamental difference between a weakness of the exchanges which might be due merely to a transient capital movement, and one that is due to a running adverse balance of payments on income account. The latter is more likely to be enduring.

Looking at the question with that distinction in mind, a large number of Dr. Snow's criticisms were really complaints that the Board of Trade estimates do what they profess to do—namely, measure the balance on income account. Dr. Snow pointed out, for example, that when we are exporting goods there is a time lag before payment is received, and that that lag tends to increase in times of bad trade. Again, he pointed out that under the present exchange restrictions in vogue throughout so large a part of the world, the exporter finds it difficult to bring home the money due to him. But both those points, and other similar points, have as their significance that we are lending on short-term to foreigners in respect of those exports. If we cannot get our money back from abroad, that may be a factor making for weakness in the foreign exchanges, but it does not affect the accuracy of the Board of Trade figures as a measurement of the amount due to us on income account.

There is, of course, no absolutely hard-and-fast line between income and capital items; and it is often possible to argue as to whether an item should be regarded as belonging to the one category or the other.

How should such a case as that of the Sydney Harbour Bridge, quoted by Dr. Snow, be treated? No doubt it is arguable that this should be regarded as a deficiency on income account; but I think there is an equally good case for treating an exchange loss of this kind as analogous to a bad investment, because it is the sort of loss that occurs once and for all, and is not likely to be repeated year by year.

With regard to the rubber companies, Dr. Snow seemed to me guilty of a fallacy. In so far as we normally have to remit abroad in respect of the cost of rubber a great deal less than the rubber fetches, that is fully allowed for under the heading of income from foreign investments. It seemed to me that Dr. Snow wanted to count it in twice over.

Turning from his criticism of the adequacy of data to the question of how seriously we should regard the balance of trade position, I differ from Professor Gregory. I think Dr. Snow brought out with admirable force what are undoubtedly very disconcerting features in the position. I thought perhaps he made a little too much of a mystery about one point. He seemed to agree that, *prima facie*, the fact that the absolute commodity import surplus is not much greater than it was in the last two years is reassuring, and, not being really reassured, he regarded this as a puzzle that it was necessary to explain. Surely the main explanation is that our commodity exports represent only part, about three-fifths, of the total resources by which we pay for our imports, and when you have a general downward movement of all items in the balance of payments, the fact that the absolute excess of imports over exports has actually tended to increase is a formidable fact. It means that, even measured in terms of values, the percentage by which our exports have fallen off in the last two years is much heavier than the percentage by which our imports have fallen off. Actually the value of our imports has declined by 28 per cent. only between 1929 and 1931, while our exports have declined by 48 per cent. Supposing a railway company derived part of its receipts from goods traffic and part from passenger, and in the ordinary way is accustomed to get £100,000 from the goods and the same amount from the passenger traffic, and that its total expenditure is £180,000, so that its profit is £20,000. If then in a period of bad trade it was found that the passenger traffic had fallen to £70,000 and the goods to £70,000, while the expenditure had been reduced to £150,000, it would not do to point out that the excess of total expenditure over the receipts from goods traffic was still what it was, namely, £80,000, and to argue accordingly that the whole trouble was attributable to a falling off in passenger receipts, and that the goods position was quite healthy. That is really analogous to the balance of payments position. The notion that our commodity balance is quite healthy, and that our troubles are entirely due to a decline in our invisible exports, is really a sheer fallacy.

Professor Gregory committed himself to the statement that with a fluctuating pound there is no balance of trade problem, that the pound has only to fall far enough to correct the balance of payments. That seems to me untrue in theory, and a proposition wholly contradicted by the experience of other countries in the inflations of the post-War period. So far from a slump of the exchange helping the balance of trade, it may even make it worse, because if the exchange falls very far, exports may be sold for greatly reduced gold values, while nearly the same gold value has to be paid for imports. That was clearly illustrated in Germany and Austria, where the stimulus to the volume of exports given by the falling mark was outweighed by the low gold prices at which they were sold.

It is not true that we can count upon the fall of the pound providing the means of correcting an adverse balance. On the contrary, the whole point of the seriousness of the balance of trade position is the danger that there may conceivably develop a vicious circle, an unfavourable balance of payments stimulating adverse capital movements, and causing a further fall of the pound, which might in turn aggravate the adverse balance.

Dr. Snow did not go into the question of what policy should be adopted, and I think that in calling attention to the seriousness of the figures he has given us something that does deserve close and careful attention.

There is one other point I should like to mention. In a way, the falling off of our invisible receipts in respect of income from foreign investments is not the significant feature, because income from our foreign investments represents the fact that we are the owners of a large part of the raw material production in the world, and while our income from investments has fallen off because of the enormous fall in the prices of those goods, we receive compensation for that fall of prices in our capacity as their principal consumer. That compensation might have gone far to maintain our balance of payments, but for the fact that the *volume* of our imports has been increasing very materially relatively to the volume of our exports. I therefore agree with Dr. Snow that the really serious feature of our trade returns in recent years is the tendency for the quantities of our imports, under the headings of both food-stuffs and manufactured goods, to increase. This is a phenomenon which cannot be dismissed as of negligible importance, as Professor Gregory attempted to do. It is a very serious phenomenon, though perhaps I take on the whole a more hopeful view of the situation than does Dr. Snow.

Dr. Isserlis said that he did not feel in the slightest degree competent to take part in the economic argument started by Professor Gregory, but he did feel that Dr. Snow had on this occasion—as on so many previous occasions—given something really interesting, from an original point of view. He would confine himself to purely statistical points. Dr. Snow complained with some justice that in this difficult matter of estimating the balance of payments the data were not adequate, and that it was necessary to rely on estimates prepared as best they could by the Board of Trade. That was, of course, an admitted fact, but he would like to say that, at any rate as far as the item of shipping income was concerned, the Board of Trade estimate had been prepared with very great care, and had, on the whole, not been very far from the mark. The method by which that estimate was prepared was set out in the articles referred to by Dr. Snow.

He (the speaker) had himself occasionally made estimates at different points of time from the Board of Trade estimates; they had not, however, been very inconsistent, though there was no particular merit in that, because he had used the same method and applied it to the same data. He recalled that on one occasion, as regards the figures for 1924, he was in the position of being able to make a totally independent check. He was given, for a substantial sample of British shipping, the actual difference between gross freights received and expenditure abroad. In 1924 the estimate was 133 million pounds for the net shipping income, *i.e.* the excess of gross freights over expenditure abroad. The Board of Trade estimate for that occasion was originally 130 million pounds, which included 6 million pounds representing the expenditure of foreign ships in British ports. The figures to compare were 133 and 124, but a later estimate by the Board of Trade—a correction of detail and not of method—gave the figure in Dr. Snow's table, including 10 million pounds expenditure of foreign ships in British ports, practically the same figure as that suggested by the sample.

Unfortunately as regards the year 1931, he had to take up the same pessimistic attitude as that of Dr. Snow. Pursuing the same method that the Board of Trade had used of recent years in its estimates, he was led in August 1931 to make an estimate of something like 80 million pounds ± 5 for the invisible exports represented by shipping earnings for 1931, which would have corresponded to the 105 million pounds for 1930. Since then he had made a comparison with the data he had used in 1924, and remembered that the 1924 figures, based on an actual sample, showed that a very large proportion—the greater part of the total net shipping income—came from passenger and cargo liner receipts. There had not only been a reduction in these items during the year, but the passenger and cargo companies had been carrying short cargoes. He came to the conclusion that the 1924 figures would lead him to an estimate of 60 million pounds. Sir Frederick Lewis, a shipowner who took a keen interest in these matters, had come to much the same conclusion. If the earnings from overseas investments for 1931 were going to show anything like the same fall as shipping earnings, as Dr. Snow had pointed out, it would be found that surplus exports of manufactured articles were themselves paying for a very small part of the surplus imports of food and raw materials, and the other sources were drying up.

There was one passage on p. 80 in Dr. Snow's paper which was interesting to note. Attention was drawn to the great change that had taken place in the manner of paying for the surplus of imports. Previous speakers had also referred to that. In this connection attention might be drawn to one pair of comparative figures. The year 1920 was not included in Dr. Snow's table; in that year the visible adverse balance of commodity exchanges was 323 million pounds. The final estimate made by the Board of Trade for the invisible exports represented by the shipping earnings for 1920 was 340 million pounds, which was in itself a reduced figure; so that in that year the whole of the adverse balance was paid for by the export of shipping services. He himself would not make any total estimate for 1931, but he thought only about one-quarter of the adverse balance was met in this way. Shipowners were probably not the only people who would like to get back to the 1920 position.

Dr. Snow made a point, and it appeared to be a proper point, that when the balancing was more difficult it then became more important to have precise figures. It was all very well not to be very particular about keeping one's accounts when there was a large balance at the bank, but when near over-drawing point it was as well to be more precise in accounting.

Dr. Isserlis said he was not speaking officially for shipowners, but he thought that if there were a strong feeling for something more precise in the way of information under that particular heading, the shipowners would be willing to volunteer as far as possible to help the Board of Trade to make a more precise estimate. He said this in order to attract representatives of other industries to make similar offers of voluntary assistance.

MR. DENNIS ROBERTSON said that he agreed strongly with some and disagreed with others of the points made by Dr. Snow. The point with which he was in strong agreement was Dr. Snow's complaint that they were still so much in the dark as to what was happening. After all, they had all voted upon this question and given lectures about it, and they were entitled, not perhaps to a perfect estimate but to some indication of what their rulers believed to be happening, and what facts were leading them to take these particular steps which they were taking. He hoped they would not have to wait until the technical methods of the Board of Trade were perfect before they were allowed to know.

The second point on which he agreed with Dr. Snow was the probable slowness and uncertainty of the reaction upon exports. Professor Gregory had raised his hopes for a moment when he enunciated the important statement that the balance of payments always balanced, but he did not go on to say that it might only be balanced through the fact that they were inadvertently or haphazardly borrowing more than they ought to, in order to make it balance. Professor Gregory apparently suggested that if the exchange were left free, then sooner or later so strong an influence would be felt on the commodity exports and imports that a balance would be struck on the current account only, and there would be neither borrowing nor lending abroad; but he (Mr. Robertson) could not see any reason to suppose that that would be so.

The points where he was more critical of Dr. Snow were, first, in his criticism of the Macmillan report and of the statement of Sir William Beveridge. What those authorities really suggested was that when this big fall in exports occurred it might be regarded as the reflex of another process that was going on. The main trouble was the terrific fall in the prices of food and raw materials which crippled the purchasing power of overseas countries, leading to a big fall in our exports. He thought all the Macmillan Committee and Sir William Beveridge did was to remind us that that process had a compensating side in making it cheaper for us to obtain our essential imports. The inference from that was, that if that force were reversed, it would act on both sides of the account, and as more had to be paid for food and raw materials, so those who supplied the food and raw materials would be in a better position to buy our goods. They were in this way pointing out the compensating features of those two sides of the account which might cheer one up a little.

The second point in which he felt a little critical was the separation of Class 3 from Classes 1 and 2. He did not believe the forces at work differed much in kind as between food-stuffs and so-called manufactured goods.

The final question left in his mind was this. Accepting the figure of an adverse balance of 50 millions a year, it was known that long loans had been raised abroad for 50 millions in the course of the year; there was therefore 100 millions to be covered somehow. How was this adverse balance in fact being met at the moment? It seemed unlikely that foreigners should be adding to their short-term loans. Was it being met by British citizens bringing back capital at the rate of one or two millions a week? Mr. Robertson asked those who knew to tell the way in which this figure was being met.

Mr. Macrosty said he would deal only with the second part of Dr. Snow's paper in which he discussed alleged errors in the trade accounts arising out of the time when and the method by which freights were paid and remittances made on account of goods sent to England to be sold on commission. With regard to freights, he thought Dr. Snow must have overlooked the practice which the Board of Trade deliberately adopted in dealing with that particular part of the problem. As Dr. Isserlis was well aware, the official practice was to take the imports and exports at their entered values and to deal with the question of the net national income from shipping as an item by itself, *i.e.* the gross earnings of shipping were taken, minus the payment by British ships in foreign ports, plus (for sake of convenience) the payments by foreign ships in British ports. Dr. Isserlis and he had tackled that problem in various ways at different times, and they always came within a measurable degree of agreement. That disposed of Dr. Snow's remarks with regard to possible imperfections in the figures in the Trade Accounts arising out of freights. With regard to commissions, the case was practically the same. The imports of goods sent here to be sold on commission were taken at the "latest sale value," and merchants' commissions earned on such goods were included in the item of "Interest and Commissions" in Dr. Snow's first table. Unfortunately, the figure so included was a very rough estimate.

As now an independent member of the public, interested in the calculations of the balance of trade and certain that if such calculations were to be made at all they should be as accurate as possible, he would like to back up what Dr. Isserlis had said with regard to the collecting of information on the invisible items of the account. He would say this for the shipping industry, that all the time he had anything to do with these calculations at the Board of Trade, the greatest and most encouraging help was obtained from the shipping industry, and he thought all concerned would agree that the estimates that had been made for shipping income were as reasonable as they could be made. With regard to what Dr. Isserlis comprehensively lumped together as "the other industries," they had always had to work on imperfect information. Sir Robert Kindersley had helped the Board with his investigations into income from overseas investments, but they were still incomplete. As for "Short Interest and Commissions," it was not creditable to the City to tolerate such incomplete estimates. The information required involved several classes of transactions, with regard to some of which it was surely possible to obtain exact data confidentially, and for want thereof the only thing possible had been to try and measure the movement against a background of international trade. "Balance of trade" was now regarded as a main factor in economic policy, and Mr. Macrosty thought that it was up to those people who would suffer if the policy were wrong to help the Board of Trade to obtain correct figures.

Sir Basil Blackett said that, following up the question of shipping income, he would like to put in a plea for some clearer visualizing of what was really meant by shipping income. It was treated as an invisible item, and spoken of very often entirely separately from commodity exports and imports, although a great part of the shipping income was actually a part of the same figure that appeared in commodity imports.

When goods were brought from the River Plate to London, they were entered in the custom returns as c.i.f. The import figure actually included quite a considerable figure representing shipping income. Apart from passengers, the shipping income was threefold :—(1) there was the income received by carrying British exports to foreign ports; (2) the income derived from carrying imports from foreign ports to Great Britain; (3) the income earned in carrying goods from one foreign port to another. It was only the latter which was not part of British commodity trade. Dr. Snow showed that he misunderstood this element in the situation when he spoke of a firm which bought equal quantities of the same class of goods from three different importers, made the same return to the Customs authorities and yet the amounts remitted overseas varied widely in the three cases. It does not in the least alter the correctness or otherwise of the Board of Trade returns. It either appears as shipping income, commodity figures or as insurance.

When dealing with statistics it was as well sometimes to get down to what was behind them.

Dr. Snow had contributed a very important element to the discussion when he pointed out the way in which the balance of exports of fully manufactured articles over imports of manufactured articles has been falling all the time until it threatens to disappear. Sir Basil Blackett was not at all sure that this change in the character of exports and imports had not something to do with the falling off in the shipping income.

Another point to which he would like to refer was the question put at the end of Mr. Henderson's speech, How was this adverse balance on income account financed? That led to another question, For what purpose was this statement of balance of payments on income account drawn up? It would seem that there was danger there of getting into a fog, because it was not the balance of payments of the United Kingdom that was really important from the question of the stability of sterling, but the balance of payments of a much wider area, which might be called the sterling area. From the point of view of effects of sterling, imports from West Africa to Great Britain or vice versa were the same as imports and exports between London and Edinburgh. The same was true of a larger area. The Board of Trade would do well if they were going to give useful advice as to the kind of tariff or other action to be taken in dealing with present difficulties, if they would try and get out, at an early date, statistics covering the sterling area, and see that there was more light on immediate problems than simply the figures of imports and exports and invisible items of Great Britain.

One speaker had argued that the fall in the price of rubber, though meaning a fall in invisible exports and less dividends, was compensated for by the fact that much cheaper rubber was obtained. The fall in the price of rubber was extremely important in the sterling position, because it reduced the extent of the sterling payments of the United States.

Mr. Osborne said that the figure of £100 million had been mentioned frequently as the probable amount of the country's adverse Balance of Payments on Income account for 1931, and that this estimate was frequently associated with the name of Professor Clay. He would like to state that Professor Clay had not published any such estimate; all he had done was to say that the balance would be adverse and might be so to the extent of £100 million. Professor Clay and he had, nevertheless, made a rough estimate early in September last which had now been corrected so far as possible. Mr. Osborne had the make-up and particulars of the methods used with him, but as this would take some time to read he proposed merely to give the various headings, the remainder being available for publication in the *Journal*.* The results were as follows :—

Board of Trade Estimate for 1930.	1931 Estimate.—£ millions.	
– 392	Merchandise	– 410
+ 105	Shipping Services	+ 90
+ 235	Overseas Investments	+ 150 to 160
+ 55	Commissions	+ 25 ,, 35
+ 21	Government Receipts	+ 15
+ 15	Other Receipts	+ 15
+ 39		– 95 to 115

It should be observed that gold movements were *excluded* from the 1931 estimate (they were *included* in the 1930 figure of 392 shown above). The net gold movement inward or outward normally represented the net change in the country's position on both capital and income account, or rather it did so to the extent that this movement corresponded to the real change in the country's own gold stock; but for the current year the gold movement was taken as belonging entirely to *capital* account.

Although in one sense the weakness of our Balance of Payments might be said to be due to the excess of commodity imports, there was nothing new in this, although the position was worsening and the proportion which the adverse merchandise balance bore to our shrinking total visible trade had grown to 31 per cent. in 1931 as compared with 18 per cent. in 1929. The immediate weakness was due to the invisible items. Normally it would be these items which should improve again if world trade revived. Of this, however, there was no immediate prospect. Indeed, if our action in restricting commodity imports made world conditions worse, any improvement in our balance on merchandise account would be more than cancelled by a further decline in our balance on "invisible" account.

The *methods* adopted in reaching the figures given above were briefly as follows :—

Merchandise.—£40 million was added for December (*i.e.* £5 million less than the adverse balance in December 1930) to the difference between the recorded imports and exports of the first eleven months.

Shipping.—It had been assumed that the Board of Trade calculations for the earlier years were correct and an endeavour had been made to find a method of continuing them.

There being no way to measure the total activity of British shipping, it had been assumed that it varied in the same degree as our overseas trade. The Board of Trade index-numbers of the volume of imports, of British exports, and of re-exports had been taken and combined into one index (on a 1924 basis), weighting each by the *values* of each of these three groups in each year from 1924 to 1930.

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* The information referred to is incorporated in Mr. Osborne's remarks as here printed.—Ed.

The Chamber of Shipping freight index was then put on a 1924 basis and combined with the former index so as to get a volume-freight index for each year.

It had been assumed that in 1924 about one-seventh of the total net shipping income was on passenger account, say, £20 million in that year, and it was further assumed that this remained constant until 1931, when it was reduced to £15 million.

The remainder of the Board of Trade figure of £140 million for 1924 would be freight earnings, say, £120 million. Multiplying this £120 million by the combined volume-freight index, figures were obtained for each subsequent year. These figures, after adding the amount for passengers, were found to agree approximately with the Board of Trade estimates for the same years. It was assumed, therefore, that the same method would be appropriate for 1931: it gave £75 million for freight, or £90 million including passengers.

Overseas Investments.—The basis of the estimate here was the conclusions published by Sir Robert Kindersley in the *Economic Journal* for September 1931. British Overseas investments in 1931 were put at the same figure as Sir Robert Kindersley estimated them at for the year 1929, although an assumption of no growth in two years was perhaps unduly conservative. Sir Robert Kindersley estimated the income from overseas in 1929 as £231 million and suggested that it would be £70 million less this year, say, £161 million. He divided his securities into the four groups referred to below.

Dominion and Colonial Government and Municipal Securities.—No default had taken place in this group in the first eleven months of 1931. The 1929 income for this group, £46·4 million, was therefore retained.

Foreign Government and Municipal Securities. — Inspection appeared to show a default of less than 10 per cent. in the period November 1930 to November 1931. The Kindersley total for this group was £18·2 million. A deduction of 10 per cent. gave £16·4 million. (It would be recalled that the Brazilian and Chilean defaults were very recent and would only be felt fully in 1932.)

British and Foreign Companies operating abroad—fixed interest securities.—After inspection of about 90 debentures quoted on the London Stock Exchange, a 10 per cent. reduction for 1931 on 1929 was again allowed, bringing the interest down from £38 million to £34·2 million.

Share Capital of British and Foreign Companies operating abroad.—The results of about 150 companies in seven important groups were inspected. Every company with a capital of £1 million or more was considered, and in the case of rubber and mines many smaller companies. These seven groups corresponded to seven groups in the Kindersley analysis, and the sample analysis was a considerable proportion of the seven Kindersley groups, these in turn representing nearly £970 million out of his total of £1,240 million capital. Sir Robert Kindersley, however, gave about twelve further groups, but some of these were small. The average rate of distribution for each of the seven groups had been calculated and applied separately to the British-owned capital of the corresponding

Kindersley group. For his remaining groups a weighted average of the rates of distribution applicable to the seven main groups had been used.

The rates declared for November, 1930, to November, 1931, were taken as applying to the year 1931 and gave a result of about £44 million.

This accounted for the interest on capital amounting to £3,438 million. Sir Robert Kindersley had estimated that at least another £300 million was held by British investors in unlisted securities and in other property. The *Economist* (November 1, 1930), on the other hand, put this holding at something nearer £700 million for 1928 and allowed a 10 per cent. distribution on that amount. The lower figure was taken and interest put at only 5 per cent., say, £15 million.

The total income for this group came to £156 million, and as Sir Robert Kindersley's estimate was £161 million, the figure was given as £150–160 million.

Commissions, etc.—The chief items in this group were Insurance and Produce Brokerage, etc. It seemed not improbable that the Board of Trade estimates for the whole group for 1930 were too high, and after taking into account a number of factors which would cause an unfavourable position in 1931, it had been thought advisable to allow no more than £25–35 million.

Mr. R. G. Hawtrey said his intention was the wicked one of making a further incursion into the clouds, as he wanted to call attention to what he regarded as a rather important feature in the theory of the balance of payments, that is to say, that the balance of payments was resultant on the action of *individuals*. The figure that had been causing misgiving was the figure representing our external investments, which had been transformed from a positive into a negative quantity. That negative quantity was the resultant of the action of all the individuals concerned in investing. It hardly needed to be said that the reduction in external investments was not due to any increase whatever in investments at home; undoubtedly there had been a heavy decrease in investments at home, so that the decrease in external investments, which had turned it into a negative quantity, was simply the outward and visible sign of a shrinkage of the savings of the country available for investment—savings out of income. If that situation was to be changed, the only way was by increased savings out of income, and the main condition for that would be an increase in incomes.

In his view the depreciation of sterling opened the door to that increase particularly because it enabled industry to become once again remunerative at world price levels. It made it possible for producers and traders to earn profits. If profits were re-created, that very fact re-created savings. When incomes and savings from profits had been re-created, the incomes would be applied to the purchase of imports, visible and invisible. The depreciation of the pound discriminated against visible imports, but not against the invisible. It was clear that the purchases of imports would be divided in a different way between the two classes, visible and invisible, through a greater demand from the individuals in Great Britain springing up for external investments. This was the process upon which the desired change in the balance of payments depended.

Mr. Hawtrey differed profoundly from Mr. Henderson's view that the depreciation of the pound would have a very slight favourable effect upon the balance of payments owing to the consequent fall in the gold prices received for exports. Depreciation and consequent reduction of costs would undoubtedly involve some price concessions. If the depreciation were slight, it might be that the whole of the depreciation would be used up in these price concessions. But when sterling became much lower, the tendency was for the British exporter to demand and receive something not far below the world price. Mr. Henderson had quoted the case of Germany during the currency collapse as evidence to the contrary. Undoubtedly during that period the markets in which German exports were sold were in a state of great disorganization. Nevertheless it was estimated by the McKenna Committee of 1924 that the Germans had accumulated an enormous balance of foreign currencies. The fact that there was this balance was significant; it implied that the currency collapse had on the whole brought about a favourable balance of payments.

Currency depreciation was a deterrent on imports not only by reducing the consuming capacity of the public, but also by giving an impetus to the production of goods in competition with imports.

One notable result brought out by Dr. Snow's statistical data was that our imports presented an enormous target for reduction. The large import excess in terms of volume instead of price showed that the possible reduction was gigantic. Mr. Hawtrey added that he differed from Dr. Snow in that he thought there was likely to be a complete transformation in the balance of imports and exports in the course of the coming year.

THE CHAIRMAN said that while he agreed with Dr. Gregory that it was always possible to live beyond one's means by consuming what had been saved in the past, or saving less than one had been in the habit of doing, one fact stood out, and hung on the last remarks of Mr. Hawtrey—the purchasing power of the national as a people in the last issue must depend upon its production and earnings from abroad. Earnings from abroad not having increased, what had happened to production? It had recently fallen in the neighbourhood of 15 per cent. If that were so, and if there was nothing to come in the way of help from abroad, that should be a measure of the reduction of the consuming power. What was in fact being done? The index of consumption of goods from abroad for final use here had gone up in quantity by about 5 per cent. The position now was that with the purchasing power fallen by 15 per cent., the nation was buying 5 per cent. more of goods from abroad. He put that down to the fact that the purchasing power of national income to the extent of two hundred millions sterling had been transferred to the working classes, and a great deal of that had gone in luxuries and things that were not considered necessary a few years ago in the household budget. Some kind of restriction was necessary.

Having had cause to work on the Board of Trade estimates in the past few months, Sir Josiah felt renewed confidence in those figures. The article in the *Economist* for the previous week seemed to have been written in a somewhat peevish spirit; it would have been more intelligible if the writer had realized that in results published in February, 1931, it was impossible to take into account the recent figures of Sir Robert Kindersley. The criticism seemed to lose sight of the kind of enquiry such as that of the Chamber of Shipping. When the article grumbled at the probably exaggerated totals of the Board of Trade figures, it was amusing that the principles advocated would give figures larger than those at which it cavilled.

In conclusion, he hoped the result of the discussion that evening, and of Dr. Snow's paper, would be to tighten up some of the statistical points. Some interesting digressions into economic theory had been made, but the main thing the public expected from a discussion of this nature was that it should clarify the statistical problem.

The following comments were received after the meeting from Mr. T. W. Wyatt :—

The discussion has been mainly remarkable for the absence of any attempt to give the reasons why a favourable balance is desirable, how it has been obtained in the past, and the conditions under which it can be obtained in the future.

A country can only have an actual balance of trade in its favour if it is willing to lend abroad sufficient to make up this balance. We fulfilled this condition for many years, but for the last few years an unofficial embargo on foreign lending has been in force. The natural effect of this embargo is a much smaller favourable balance, a big decrease in our exports, a decreased production of manufactures, and a smaller income owing to this decrease. Naturally, savings on a smaller income will also be less.

The President stated production had recently fallen, expressed concern, and implied that a certain amount of belt-tightening would be necessary.

The reason for the decreased production is given above, and the cure is obvious: more foreign lending, provided we can ensure the money lent is used for purchase of our goods. This is not insuperable. As for belt-tightening, this is surely an extraordinary paradox, for one feature of the slump has been the superabundance of the very things we should go without if belts are tightened, and another that the countries who are responsible for the abundance are themselves more embarrassed than ourselves and are our best customers for manufactured goods.

Our belt-tightening cannot help them or their position as our customers and debtors.

Surely the best way out of the impasse is to increase our income rather than tighten our belts. If we can ensure the import of sufficient food and raw materials for home consumption and production of exports, where is the necessity for any concern over our position?

One feature of the crisis has been the indication of the weakness of the economic position of primary producers. Our market is of supreme importance to them, and they have been compelled practically to accept what we can pay. We must find some means of lending abroad in order to increase production for export, and thus increase our income (wages, salaries and profits), shipping, insurance, banking, etc. The only alternative to lending abroad is for us to pay much more for our food and raw materials.

Dr. Snow, who spoke only briefly at the time, afterwards sent the following reply to the discussion:—

I do not consider that the discussion was as useful as a discussion on such a subject before such a Society should have been. Perhaps, however, I am responsible for this through having introduced a sentence which provoked Professor Gregory to lead the way into the region of economic theory, whereas the intention of the Society in arranging the discussion had been to try to throw light on some statistical points. As other speakers disagreed so emphatically with Professor Gregory on points of economic theory, it hardly seems necessary to defend the provocation. Professor Gregory (and also Mr. Henderson) could not have noticed that twice in my opening paragraph appear the words "balance of income and expenditure." If he had appreciated that the object of my remarks was to discuss certain doubtful statistical points in connection with the drawing up of this income and expenditure account, he would probably have avoided speaking of "the quite stupid play upon words contained in the sentence (nowhere, however, to be found in my remarks) that the balance of trade is inadequate." The language of business is quite good enough for use in dealing with this problem. If a firm's income in a year falls short of its expenditure it has an adverse balance on trading account, but continues in business by drawing on its capital or its reserves. A nation can do the same thing, and it is certainly a convenience that the language daily used in the one kind of case should be used also in the other. There is no question of the "balance of capital transactions" being "an afterthought." In each case an arbitrary period—one year—is selected and the positive or negative excess of income over expenditure in that period is determined. Only in the case of a firm winding up has the "balance" more than arbitrary significance, because in one day after the end of the period the position will have changed. Whether it winds up or not, however, it is important to measure its income and expenditure accurately.

Professor Gregory's statement that "we must expect a larger numerical adverse balance if we let down the gold value of the £" is no doubt true in such a case as he refers to, where the £ is reduced to 1*d.*, but it is not necessarily true when the gold value of the £ is "let down" by only about 30 per cent., as has been the case over the last quarter of 1931. If the sterling prices of imports and exports do not rise while this depreciation of the £ is going on, there is no reason to expect the magnitude of the figures representing the value of the difference of the imports and exports to increase. The following figures, published since the discussion took place, show that the depreciation of 30 per cent. in the existing value of the £ has not yet led to a general increase in the magnitude of the figures which express the value of our imports and exports.

Average Quarterly Values of Imports and Exports.
Index Numbers.
1930 = 100.

	Imports.	Exports.
1930 IV	92·2	96·4
1931 I	84·4	93·2
„ II	81·7	90·8
„ III	78·6	87·8
„ IV	78·6	86·0

With regard to the statistical point illustrated by the case of rubber plantations, I feel that this is an important one as regards the comparison of the figures for two separate years. Mr. Henderson considers that there is nothing in the point, but his argument does not convince me. It would be more convincing if I were assured that in calculating the value of the income on foreign investment, the losses on some investments were set off against those making profits. I do not know how the details of these estimates are carried through, and was hoping that somebody might throw light upon them. If in calculating the income from foreign investments in 1931 the losses on British rubber plantations and similar properties abroad (to meet which money has had to be remitted from this country) are subtracted from the profits on other items before the final figure is obtained, Mr. Henderson's criticism is valid, but unless this is the case I see no reason for modifying my view. Similar consideration applies to the question of shipping earnings. If the losses involved in making payments abroad, where these payments exceed the amount received for freights, are taken into account in reaching the figure for income from shipping, my point is met. In any case, however, this consideration in connection with shipping is of less importance than it is in connection with investments abroad.

The calculations of the income from shipping and from overseas investments, if they are to be accurate, cannot, in my opinion, be entirely divorced from those by which the balance on commodity account is determined, and I hold the view that if the data were available for a detailed scrutiny to be made, a number of adjustments would be introduced into the statement.

As a result of the ballot taken during the meeting, the candidates named below were unanimously elected Fellows of the Society:—

Harold Barger, B.A.
Thomas John Beynon.
Sydney S. Gampell.
Arthur Daniel Morgan, B.Sc. Econ.
Lionel Robbins, M.A.
Hirday Nath Sapru, B.A.
George Leopold Schwartz.

MISCELLANEA.

THE INTERNATIONAL INSTITUTE OF STATISTICS, MADRID, 1931.

By A. L. BOWLEY, Sc.D., F.B.A.

THE International Institute of Statistics held its 20th Session at Madrid, September 14th to 20th, 1931. The proceedings were opened by Señor N. Alcalá Zamora, President of the Government of the Republic. A considerable part of the meeting was devoted to the consideration of the report of a committee on the revision of the Statutes of the Institute which had been appointed in Warsaw in 1929. Though it is generally recognized that some re-orientation of the aims and methods of the Institute is desirable, and the discussion on the subject was illuminating, no decisions were reached, and the whole matter was referred to the officers (Bureau) of the Institute to examine the question further after communicating with the members, with a view to amendment of the Statutes at the next ordinary session. During the interval, however, it will be within the power of the Bureau to modify or develop the publications of the Institute. M. Delatour, who has been President of the Institute since 1925, did not wish to stand for re-election, and in his place Dr. F. Zahn, President of the Statistical Office of Bavaria, was elected. M. Huber takes his place as Vice-President, Professor Willcox, M. Julin (Vice-Presidents), M. Methorst (secretary), and Professor Bowley (treasurer) were re-elected, thus completing the composition of the Bureau. It was decided to hold an extraordinary Session in Mexico in 1933, on the analogy of the meeting last year in Japan, while the date and place of the next ordinary Session were left open.

In spite of preoccupation with private business, sufficient time was found for the presentation and discussion of a large number of papers, some of which were of considerable interest and utility, and 23 resolutions were passed, many of them involving investigation by committees of the Institute. Copies of the papers presented are now available at the London School of Economics, and a list of them is subjoined.

The Bulletin of the Institute (Tome XXV-3$^{\text{ème}}$ livraison) containing the text of the Reports and Communications presented at the Tokyo Session of 1930 was issued last autumn. A list of the papers was appended to the article descriptive of that meeting which appeared in Part I of the *Journal* for 1931.

PREMIÈRE SECTION.

Statistiques démographiques.

1. Exposé des travaux de la Commission pour la Statistique des Grandes Villes (Rapport de M. Thirring).
2. Les éléments de la croissance des Grandes Villes (Communication de M. Böhmert).
3. Relevés locaux de la circulation complète (Communication de M. van Zanten).
4. Statistique des migrations (Rapport de M. Zahn).
5. La loi relative au nombre des immigrants admis par an aux Etats-Unis (Communication de M. Willcox).
6. Enquête sur l'opinion publique pour abolir le XVIIIe " Amendment " aux Etats-Unis (Communication de M. Willcox). (Not received.)
7. Tables de mortalité (Rapport de M. Huber).
8. Le taux de mortalité pour le cancer et la composition par âge de la population (Communication de M. Bohmert).
9. Statistique des nationalités (Communication de M. Földes).
10. L'Utilisation des observations météorologiques par la Statistique officielle (Communication de M. Thirring).
11. The 1912 Census of China. Le Recensement de Chine en 1912 (M. Lieu).
12. Differential Fertility according to Social Class (M. Chen). (Not discussed.)

DEUXIÈME SECTION.

Statistiques Economiques.

1. Exposé des travaux de la Commission des prévisions économiques (Rapport verbal de M. Bowley).
2. Statistique des transports (Rapport de M. Girard).
3. Statistique des transports (navigation) (Rapport de M. Piekalkiewicz).
4. Statistique des finances publiques (Rapport de M. Piekalkiewicz).
5. Statistique des prix de produits finis (Rapport de M. Platzer).
6. Salaires comme élément du coût de la production (Communication de M. Simiand).
7. La statistique des occupations productives des femmes (Communication de M. Platzer).
8. Une statistique internationale des trusts (Communication de M. Hecht).
9. La statistique du marché intérieur (Communication de M. Zahn). (Not received.)

10. Statistique du mouvement extérieur de marchandises des Grandes Villes (Communication de M. Morgenroth). (Not received.)
11. Statistique de la consommation et des stocks (Communication de M. Craig).
12. Le service statistique des Banques de crédit agricole hypothécaire (Communication de M. Piekalkiewicz).
13. Sur la mesure statistique de la concentration (Communication de M. Gini).
14. Sur la mesure statistique de la concentration (Communication de M. Pietra).

TROISIÈME SECTION.

Statistiques Sociales.

1. Compte rendu de l'état d'avancement de la statistique intellectuelle (présenté par M. March).
2. Chômage et salaires réels (Rapport de M. Hilton).
3. Statistiques historiques (Rapport de M. Simiand).
4. Le montant des budgets des principaux Etats de l'Antiquité grècque (Communication de M. Andréadès).
5. Statistique des logements (Rapport de M. Pribram). (Not discussed.)
6. Statistique criminelle (Rapport de M. de Roos).
7. Statistique criminelle (Communication de MM. Gini et Spallanzani).
8. Statistique du personnel des Administrations et des Services publics (Rapport de M. Methorst).
9. La comparabilité des statistiques périodiques (Communication de M. Platzer).
10. Une nouvelle série de monographies de familles agricoles en Italie (Communication de M. Giusti).

REVIEWS OF STATISTICAL AND ECONOMIC BOOKS.

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1.—*British Association for the Advancement of Science. Mathematical Tables*, Vol. I. 11″ × 8½″. xxxvi + 72 pp. London: 1931. Price 8*s*.

All scientific workers who need numerical values of important mathematical functions will extend a ready welcome to this volume, in which the British Association Committee for the Calculation of Mathematical Tables have brought together in a uniform form some tables previously published and some specially prepared for the present instalment. The tables included are those of

> $\frac{n\pi}{2}$, $\sin x$ and $\cos x$ (radians), $\sinh \pi x$ and $\cosh \pi x$, $\sinh x$ and $\cosh x$, $\int_{\infty}^{-x} \frac{e^{-u}du}{u}$, $\int_0^x \frac{\sin u du}{u}$, $\int_x^{\infty} \frac{\cos u du}{u}$, $x!$, $\int_0^x \log_{10}(t!)dt$, the first four derivatives of $\log x!$, $\int_{\infty}^{x} e^{-\frac{1}{2}x^2}dx$ and repeated integrals of this normal integral forwards to order 21 and backwards (*i.e.* derivatives) up to order 7.

Many of the tabulations are to fifteen places of decimals, others to ten or eleven, and the arguments have been cleverly arranged so that with the aid of the central differences provided, the maximum of information is available in the minimum of space. The introduction is the work of several authors. A. J. Thompson introduces it by a six-page note on the use of central differences, and L. J. Comrie explains how by a modification of 4th (or 6th) differences the tables have been made to give results almost as accurate as could have been obtained by including 6th (or 8th) differences. L. J. Comrie, J. Henderson, A. Lodge, J. Wishart, J. O. Irwin and R. A. Fisher have provided the remainder of the explanatory matter. The lion's share of the work of computing the actual tables has been done by J. R. Airey, the rest by A. T. Doodson, L. J. Comrie and R. A. Fisher. The editorial work was begun by R. A. Fisher and completed by J. Henderson. This long list does not exhaust the names of those who have co-operated in the work, as other members of the Committee have assisted in the preparation and checking of the tables and in proof-reading. The result is a beautifully printed book which should as far as is humanly possible be free from error. Workers who make much use of tables will appreciate the fact that entries are arranged in groups of five lines with a space between successive groups, and that the figures are supplied with heads and tails and are themselves separated into groups of five. All of the tables will be useful to the mathematical statistician in some of his work, and some, such as those of the repeated normal integral, will prove indispensable in the applications of the results obtained in recent years in connection with the exact distribution of statistical constants in sampling from normal populations. This is a book that will become as much dog-eared as Barlow. L. I.

2.—*Vorlesungen über die Grundzüge der Mathematischen Statistik.* Von C. V. L. Charlier. 8¾″ × 7″. 127 pp. Lund: C. W. K. Gleerups. 1931.

On reading a reprint of the second edition of this work, apparently never before reviewed in the *Journal,* one is struck by the amazing clearness of Professor Charlier's exposition. To all those who can read German (even with difficulty) this book, scarcely more than 100 pages long, may be confidently recommended in spite of the eleven years which have elapsed since the German edition was first published.

It is well known that Charlier divides statistical problems into those of "homograde" and "heterograde" statistics. This distinction is essentially the same as that between discrete and continuous variates, its importance lies in the application of the Lexican theory of dispersion to the former. Accordingly, the first part of the book deals with homograde statistics, and hyper-normal and sub-normal dispersion are carefully and fully explained and well illustrated by examples.

In the part of the book dealing with heterograde statistics the author shows us with the utmost clearness how to fit his Type A and B frequency curves. The need of an extensive numerical comparison between the results obtained by Charlier curves and other systems is probably as great to-day as it was ten years ago, but as much attention would have to be paid to methods of fitting as to the Type of curve used. Goodness of fit tests are useless if errors of estimation are comparable with errors of sampling.

The third section of the book deals with correlation; product moment methods are dealt with as the earlier part of the book would lead us to expect, and there is a good account of the estimation of correlation from fourfold tables. The reviewer's personal opinion is that the value of the correlation coefficient in dealing with fourfold tables has been over-estimated, that a comparison between the proportions of the individuals possessing one character among those who do and do not possess the second character is usually adequate. If the test for significance is correctly carried out the result is identical with that obtained from the χ^2 method. J. O. I.

3.—*Représentation des lois empiriques par des formules approchées, à l'usage des chimistes, des physiciens, des ingénieurs et des statisticiens.* Par M. Fréchet et R. Romann. 10″ × 6¾″. vii + 302 pp. Paris: Léon Eyrolles. 1930. Price 35 *frs.*

This is an admirably clear account of methods of fitting empirical curves to numerical data. After an introduction which deals with the elementary notions of a function, we pass on to the fitting of straight lines where, in addition to the method of least squares, the method of minimum deviations and certain graphical methods are considered. The latter have much to recommend them where no very great accuracy is required.

The following chapter is a very useful one; it deals with forms the fitting of which can be reduced to the problem of fitting a straight line. While it is well known that such forms as

$$y = ax^b \quad \text{or} \quad y = ab^x$$

can be so reduced, the method of reduction of

$$y = ax + b + \alpha\beta^x \text{ or } y = \frac{a'x + b'}{a''x + b''}$$

is less obvious. It is perhaps of interest that the problem of fitting a normal curve can be so reduced, though this procedure is hardly to be recommended. The chapter on fitting harmonic functions by least squares seems especially lucid, and the book ends with a convenient résumé of the rules required in the various cases considered. J. O. I.

4.—*Probabilités et Statistiques.* By R. de Montessus de Ballore. 10″ × 6½″. ix + 211 pp. Paris: Librairie Scientifique Hermann et Cie. 1931. Price 60 *fr.*

The title of this book is a little misleading, as it is really a short treatise on the point-binomial. The work is clearly set out and the reader should have no difficulty in following the proofs of the main properties which the author uses. We think, however, that many statisticians will doubt whether the binomial distribution is relevantly applicable over such a wide field as that to which M. de Montessus de Ballore would apply it.

The binomial distribution is only unquestionably applicable to discrete distributions where the exponent is known *a priori*. Examples of such cases are the distribution of the number of males in families of a given size, the proportion of ears of a cereal infected with a pest in samples of given size, or the number of patients who recover from a disease in, let us say, groups of thirty receiving the same treatment. (It is not, of course, contended that the binomial would necessarily fit such distributions, merely that they form the field in which it is worth while testing the hypothesis.)

With somewhat less obvious appropriateness but still, we think, quite legitimately, the binomial may sometimes be used for *discrete* distributions where the exponent is not known *a priori* but must be determined from the data. Examples are the distributions of suicides or the deaths from alcoholism in the states of a given country.

We are, however, by no means convinced that there is any particular relevancy in fitting a binomial to data where the variate is essentially continuous. Not only does M. de Montessus de Ballore do this, but he even fits it to data which are not even frequency distributions at all, such as the mean monthly temperatures at Paris in January, February, March, etc.

If, nevertheless, the binomial is fitted to continuous data, the simplest method is to assume the form $c(p+q)^n$, c being the interval. c, p, q are then easily determinable from the first four moments of the data, the position of the fitted distribution being fixed by superposing the two means. M. de Montessus de Ballore, however, complicates his problem by always identifying the interval of his binomial with the arbitrary interval of grouping of the data, a procedure which obliges him to introduce a constant of displacement h, usually a proper fraction, and to adopt for his frequencies the form

$$\frac{m'}{(mp-x-h)!\,(mq+x+h)!}\;p^{mp-x-h}\quad q^{mq+x+h}$$

$x = 0, \pm 1, \pm 2, \pm 3, \ldots\ldots$

Here $x = 0$ corresponds to the largest observed frequency and m, p, q, h, are determined from the data, but this procedure makes the process of fitting somewhat complicated and apparently leaves the author a little uneasy, since he introduces a discussion on the effect of combining his theoretical frequencies into coarser groupings and notes the resulting distribution is not strictly binomial.

The author also seems to think that he can reduce the relative probable errors of his freqency groups by multiplying them by an arbitrary multiplier. If p is the proportion in any one frequency group when n individuals have been observed, the standard error of p is $\sqrt{\frac{pq}{n}}$ and of np is $\sqrt{npq}$; the standard error of xnp (x being an arbitrary multiplier) will be $x\sqrt{npq}$, but, according to the author, it would be $\sqrt{xnpq}$, which would only be applicable if nx individuals and not n had been observed. J. O. I.

5.—*The Institute of Actuaries' Text-Book on Compound Interest and Annuities-Certain.* By the late Ralph Todhunter. Third Edition, revised and enlarged by R. C. Simmonds and T. P. Thompson. 8½″ × 5½″. 262 + xiv pp. Cambridge: University Press, 1931. 17*s.* 6*d.*

The new edition of Todhunter's text-book on compound interest and annuities-certain is an excellent example of how a good text-book can be revised without altering its character or making it appear as a piecemeal production.

The chief alterations have been a rearrangement of the chapters, the devotion of a whole chapter to accumulative sinking funds and the elimination of the miniature text-book on mathematics which Todhunter included but has become unnecessary with the publication of a separate text-book for actuaries dealing with interpolation, etc. The revisers have added examples and modernized the work and have rearranged and extended the interest tables.

These alterations are, I believe, such as Todhunter would have approved.

The book is, we think, the best text-book available on the subject, and the revisers are to be most heartily congratulated on the skill with which they have contrived to let the book remain Todhunter's Text-Book, in fact as in name. W. P. E.

6.—*The International Gold Problem.* Collected Papers: a Record of the Discussions of a Study Group of Members of the Royal Institute of International Affairs, 1929–31. 9¾″ × 6½″. v + 240 pp. Oxford University Press, 1931. Price 12*s.* 6*d.* net.

An additional zest is added to this book by the sight of the words "subject to alteration without notice" after the notation of the price on the dust-cover. One is at once reminded that there is a practical side to all these discussions about gold, and opens the pages with a lively hope that some aid toward a solution of current problems may be obtained. A list of forty-five names of "members of the group who have contributed material to this volume" is seen, "a galaxy of talent," to use the inevitable cliché, and the reviewer is at the same time daunted by the weight of authority and comforted by the thought that experience would continue to show that so many men could not possibly agree about currency. Sir Josiah Stamp opened the series with an introductory survey on "The International Functions of Gold," in which he suggested "four chief avenues of approach." "First there is the quantity of gold available; secondly, the better use of the existing gold stocks; thirdly, a better utilization and extension of the superstructure of credit; fourthly, ancillary methods of increasing the stocks of gold." In the discussion the problem-words "psychology," "trade cycle," "stabilization" were added.

Mr. D. H. Robertson introduced the second discussion on "How do we want Gold to Behave?" but really talked about how he wanted prices to behave; the subjects are not really remote. His "approach" was curiously academic, but he appeared to favour slowly falling prices. Arising from increased production they would benefit the consumer; they would improve the position of the wage-earner without friction; they would preserve an equilibrium between voluntary savings and investment; the producer would not be damaged or discouraged since costs would fall as well as receipts. The possible necessity of reducing British prices as a consequence of increased productivity he regarded as " part of the price we have to pay for internationalism." The discussion strayed considerably outside the paper, and perhaps the most significant feature was the objection raised by Dr. Coates and Mr. Glenday to the suggestion that the producer would not suffer from slowly falling prices, but it was a little hard on Dr. Coates when Mr. Robertson retorted that he spoke " with the voice of the inflationist entrepreneur of all ages."

Mr. Joseph Kitchin next contributed a memorandum and paper on " Gold Production " with many statistics, some important, others of less value. He claimed to have proved that " on the basis of 1850 to 1910 an increase of 3·1 per cent. per annum compound reckoned on the total stock of gold money was required to support the world's economic development as experienced in that period, and with a stable level of prices." And he concluded " that, on 1850 to 1910 experience an increase in the gold in central banks and treasuries of somewhere between 3·1 per cent. and 3·4 per cent. is required to keep prices stable if the world's rate of development is not slowed down, and I cannot conceive of anything like this rate of increase being attained." Mr. Hawtrey, however, pointing out that in his calculations over 1850–1910 Mr. Kitchin had forgotten silver and the great increase in credit instruments, declared that " it seems to me that the 3·1 per cent. is actually based on no evidence whatever." Some divergence of opinion also showed itself as to the amount of the industrial use of gold.

Appropriately enough the next paper was one on " How to Economise Gold," by Sir Otto Niemeyer, who discussed four methods as exhausting possibilities. These were: continued abandonment of the circulation of gold coins; " reduction in the customary margin kept by credit institutions over and above their legal minimum of cover "; reduction in the actual legal ratios themselves; and the gold exchange standard, " the arrangement by which part of what used to be pure gold becomes reserves in gold currencies in other countries." He thought that there would be serious practical difficulties of a local character in the way of the adoption of the second and third methods, and that the third (though now suspect on the Continent as a British dodge !) deserved careful exploration. The gold exchange standard received a good deal of support in the discussion, and the immediate and related problem of correcting the unequal distribution of gold was also referred to. Mr. Hawtrey thought there was no scarcity of gold and considered that what was required was " the adoption of some system of stabilization which will prevent the inflation of gold " when gold production fell off. He also gave a useful explanation of how France and the United States came to accumulate gold.

Dr. Palyi, the economist of the Deutsche Bank in Berlin, covered a wide range in dealing with " Some Problems of International

Banking Policy." He thought that there was no shortage of gold and that "the real forces underlying the situation did not arise from monetary factors." Business forecasting of price trends was possible for "a substantial period of time . . . at least a few months"; if industrial prices were falling, gold would be diverted from industrial to monetary uses, thus partly counterbalancing the falling tendency of prices. "The real elastic factor in international trade," he held, was the movement of capital. These movements were no longer purely rational, determined by interest rates; considerations of risk created a preference for short-term placements, and "there is an unusually large amount of deliberate governmental or note bank policy in the capital movements." Mr. C. H. Kisch put a paradoxical question: "If every business man knew what the future of prices was to be and applied that knowledge to his own particular business, and others in the same branch of business did the same thing, would not the fact that they all had the knowledge in advance and acted accordingly lead to a disappointment when the time arrived?" Dr. Palyi agreed, but added "that there is very little danger of our forecasts becoming anything like complete and perfectly reliable."

The next three addresses—"Central Bank Reserves," by Mr. C. H. Kisch, C.B., "For what Objects do Central Banks Hold Gold," by the Hon. R. H. Brand, and "The International Consequences of the Present Distribution of Gold Holdings," by M. Charles Rist—were closely connected in topic and covered much of the same ground. Mr. Kisch added to his paper a useful summary of the legal provisions governing reserves of Central Banks and comparative tables of their financial position in 1914 and in 1929–30. From the first two papers and the discussion it became plain that the Group was fairly well agreed on certain points—that there should be no return to the circulation of gold coin; that (as Mr. Keynes said) "the gold which a central bank holds ought to have no particular relation to its note issue"; and that, to quote Sir Basil Blackett, "the amount of gold that a central bank requires is the amount that will make it perfectly safe for meeting an external balance of payments against it at any given moment"—a view which some of us have held for a long time. Mr. Kisch also discussed the desirability of reducing the central banks' ratios of gold to notes and deposits and the possibility of extending the gold exchange standard as means of economizing gold. There were difficulties, because a gold basis was regarded as evidence of economic respectability and financial strength, with which often went political power, but something might be done if by common consent the Bank for International Settlements were selected as the safe deposit for the foreign exchange holdings of the several banks. Much was said of the gold hoards of the United States and more of those of France. M. Rist devoted most of his address to a direct or indirect defence of the financial policy of his country which was not without subtlety. His main theme was that the flow of gold to France was a natural movement, directed by the balance of payments, but it was quite clearly pointed out (especially by Mr. Hawtrey) that the unfavourable effects of this flow were due to the defective banking legislation of France. That the powers of the Bank of France remain limited is evidence that neither the French Parliament nor the French people has the will either to restrict gold imports or to help their redistribution. Sir Henry Strakosch added another point, saying: "I believe that France stabilized her currency at a point which was completely out of joint with world prices; that is to say, she stabilized her currency with the franc having an internal purchasing power largely in excess of its external purchasing power. That fact brought with it a necessary movement of gold into France in order to establish the equilibrium."

A long notice in this *Journal* of a non-statistical work is usually held to require some defence. None is offered on this occasion. This is quite the most important work on the international gold problem which has appeared in recent years, and, as that is the most important economic problem of the time, it is only fair to Fellows to indicate to them somewhat fully what they will find in the book. They will also find a great deal more in it which will repay close study. It is not necessary to attempt to apportion merit, but some preference may be expressed for Mr. Brand's paper, which, to adopt expressly the language of Sir Basil Blackett, gets down "to what, to me at any rate, is the guts of this particular question." H. W. M.

7.—*This Gold Crisis.* By F. W. Pethick-Lawrence. $7\frac{3}{4} \times 4\frac{3}{4}$. 244 pp. London: Victor Gollancz, Ltd., 1931. 3*s.* 6*d.* net.

Mr. Pethick-Lawrence has dealt fairly with his subject in a manner partly statistical, partly controversial. The earlier part is elementary, and gives a clear account of banks and their functions and of gold and its uses. It also describes how the Bank of England used to maintain its average stock of gold mainly, but not entirely, through changes in Bank Rate. The late Financial Secretary holds the view that the Bank cannot increase the currency directly, since its notes would soon be returned through the joint stock banks, but that it can create or expand credit by buying securities. Mr. Pethick-Lawrence has no doubt that postponing war taxation does not enable people to postpone financial sacrifices, thus implying a criticism of the Treasury in 1914–15, when he thinks heavy taxation ought to have been imposed. He holds that, while it was foolish to try to pay for the war by inflation, it was disastrous to apply deflation so continuously in 1920–21, and does not admit that deflation is a remedy for inflation, thinking them both wrong. He was against Mr. Churchill's return to gold in 1925, and reckons that this policy knocked 10 per cent. off the price which we received for our exports of coal. In fact, he has no doubt that the return to pre-war parity, when other European countries cut down their new currency to a fraction of the old, was a disastrous mistake.

Perhaps the main purpose of Mr. Pethick-Lawrence's book is to argue that unemployment is not an economic but a monetary phenomenon. He rejects the "over-production" theory, because it did not operate in America between 1922 and 1929; he believes that falling prices mean unemployment, while stationary or slightly rising prices mean recovery. From his own illustration of the manufacturer (pp. 133-4) one might infer that the lack of profit is really the governing cause. He blames the Peace Treaties for the chaos in Europe, and thinks that trade will not recover until reparations and war debts are cancelled; France and the United States have a special responsibility through their high tariffs and continuous absorption of gold. He does not want a return to gold, even at a lower standard of \$3.80 or \$4: but favours a "managed currency," which will "preserve a stable level of prices in this country," leaving the foreign exchanges to look after themselves. Possibly an international agreement might keep both prices and exchanges stable. Looking to the future he wants the Bank of England to be "controlled," because he thinks its powers are dangerously great. But if Governments, as he asserts, are mainly responsible for our present troubles, why give them more power of interfering with men of business? As to the crisis of September last, Mr. Pethick-Lawrence blames the City and the Bank of England for lending abroad so freely in 1930 and the early part of 1931. He thinks that the country was unduly alarmed by the May Committee's Report. He is still of opinion that a Government may borrow to meet current expenditure when an individual must not; *e.g.* it was not necessary to have budgeted to meet *all* the estimates of the May Committee.

J. E. A.

8.—*The Problem of maintaining Purchasing Power: a Study of Industrial Depression and Recovery.* By P. W. Martin. 8½" × 5¼". xiv + 314 pp. London: P. S. King, 1931. 15*s.*

The main thesis of Mr. Martin's book is that although general over-production is impossible, yet there may be over-production in the sense that "the volume of purchasing power being used to buy finished goods of all descriptions is not sufficient to provide a market at remunerative prices for the total volume of finished goods actually being offered for sale." He admits that in general the purchasing power of the community is but another aspect of the production of the community, and there must therefore be a tendency to equilibrium, but he investigates the possibility of forces which may influence either purchasing power only, or the money value of goods offered for sale only. In either case there would be a tendency to throw what he calls the "market comparison" out of balance.

Mr. Martin illustrates his arguments by frequent diagrams, but diagrams, useful as they are, may give a spurious air of simplicity to a complicated situation, and the author has not escaped falling into this trap. He pictures a stream of services of labour and capital flowing from the community to industry and, in return, wages and dividends flowing back to the community. For the sake of illustration he takes these to be of the value of £10 million, so that there are £10 million worth of goods on the market and £10 million to buy them. But if, for example, the community, instead of spending the whole of its income, puts £1 million back into industry to provide working capital, or if industry keeps back undivided profits to the extent of £1 million, then, he states, there can only be £9 million available for purchasing goods which are worth £10 million. Other factors which might influence the equation, such as fluctuations in the value of commodity stocks held or changes in the supply of money, are dealt with on exactly similar lines. In the light of Mr. Martin's diagrams it looks so simple, but the economic life of a country is not a flat surface like a drawing on a sheet of paper, and Mr. Martin, thinking always in two dimensions, fails to consider the forces that may be at work below the surface. Such vital factors as the reactions on prices or the adaptability of costs are never adequately taken into account, nor does he always clearly realize the implications of the terms he uses. Take the example referred to above of undivided profits. If wages and distributed dividends together account for only £9 million instead of £10 million, £1 million being kept back for working capital, in what sense is it true that goods worth £10 million are on the market? The cost of production is clearly only £9 million. There is no realization at any point of the book of the distinction between the remuneration of capital which enters into the costs of production and profits of a kind that do not.

One of the chief features of Mr. Martin's analysis is a distinction made between money borrowed from the community for fixed capital and money borrowed for working capital. If £1 million is abstracted from the purchasing power of the community to obtain fresh fixed capital, the decrease in the demand for consumption goods is counteracted by an increase in the demand for capital goods; on the other hand, so runs the argument, if the money is borrowed to pay the wages of additional workmen, though the immediate loss to the purchasing power of the community is counteracted by the additional £1 million paid to the new workers, at the same time extra goods, of which the labour cost is £1 million, have been added to the total output. There is thus still £10 million of purchasing power available, but there are now £11 million of goods on the market and a deficiency in purchasing power arises. Clearly this distinction between money borrowed for fixed capital and money borrowed for working capital is unsound. By some amazing oversight Mr. Martin takes no cognizance of the fact that increased fixed capital also means eventually an increase in the volume of consumption goods. There can be no fundamental difference from his point of view in the effects on the balance of supply and demand whether output is increased through borrowing for fixed capital or by borrowing for the wages of additional workmen. No one, of course, will question the elementary fact that, all other factors remaining unchanged, an increased volume of goods, however brought about, cannot be disposed of unless there is an alteration in price. By regarding prices and costs as fixed quantities a completely unreal picture of results is obtained, though Mr. Martin prides himself on his "realistic approach." There are times when he seems to be groping after something similar to Mr. Keynes's distinction between saving and investment, but his analysis is so incomplete and there are so many elementary fallacies in his arguments that his conclusions have little value.

The same general criticism of his methods applies to the section of the book dealing with the cures for trade depression, or, as Mr.

Martin phrases it, for the maintenance of purchasing power. With the proviso that the Government must act in co-operation with those of other countries, in times of trade depression, he would like to see the Government undertake public works of a kind which would not increase the supply of consumption goods; the necessary funds would be obtained from loans from the commercial banks, arrangements being made at the same time with the Central Bank so that a sufficient amount of new money should be put into circulation to form the necessary basis of credit. Whatever individual opinions may be as to the merits of this proposal, it is certain that Mr. Martin does not prove his case. He never discusses whether there are limits to the creation of bank credit, nor does he attempt to show how this in effect differs from direct borrowing by the Government from the Central Bank. Further, there is no reference to the repercussions that the artificially induced rise in prices might have on costs and the distribution of wealth.

Though most of the book is written from a general and theoretic standpoint, the last part deals with the present situation. The analysis of the existing depression is certainly incomplete, since no mention is made of the peculiar condition of the present distribution of gold. A more general criticism, here as in the earlier sections, is that throughout Mr. Martin emphasizes the question of demand and of available purchasing power; any reference to the question of costs of production is quite incidental. Whether in dealing with the particular situation to-day or with the general question, this is a vital factor, and any consideration of the equilibrium of demand and supply that largely ignores this can never be satisfactory.

W. A. E.

9.—*Credit and Currency Control*, with special reference to Australia. By D. B. Copland, M.A., D.Sc., Professor of Commerce in the University of Melbourne. Economic Series, No. 9. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. 146 pp. Melbourne University Press, 1930. 5*s.* 6*d.*

Professor Copland's book is a collection of essays and addresses written at different times and for different purposes. It has the inevitable drawbacks of this type of production. It is not, and does not aim at being, a complete survey of the problem of credit and currency control; at the same time there is a certain amount of repetition, as the author himself admits in his introductory note. Nevertheless, the separate articles are closely reasoned and competently written; the book as a whole does convey a clear outline of the special difficulties with which Australia is faced; and within its limits it provides useful material for those who wish to study how the world-wide economic difficulties are reacting in other parts of the Empire.

Nearly half the book is taken up by a chapter on "Monetary Policy and its Reactions upon Australia," which is a reprint of Professor Copland's Presidential Address to Section G at the 1924 meeting of the Australasian Association for the Advancement of Science. Much water has flowed under the bridges since the address was delivered, but it stands the test of the seven eventful intervening years better than many other writings on monetary science, even though at that time Professor Copland was troubled by the dangers of a possible rise of prices in U.S.A based on the increasing stocks of gold held there. The address was in part a survey of modern theories of monetary policy, such as Irving Fisher's index-number theory and Mr. Keynes's views, as put forward in his volume on Monetary Reform. Professor Copland is a wholehearted adherent of a managed currency, but does not attempt to make any final pronouncement as to the methods which are likely to prove most suitable. There is nothing very new in his theoretical discussion, competently as it is written within its self-imposed limitations; the more valuable part of the essay deals with factors in the Australian situation at the time, *e.g.* the fall in export prices and the lack of purchasing power parity between England and Australia, which was very marked in 1920 and 1921.

Other chapters in the book deal explicitly with Australian questions, such as "Central Banking and Recent Developments in Australian Banking" and "Australian Banking and Exchange" (written in 1925). Professor Copland believes in a gold exchange standard for Australia rather than a gold standard. He would like to see the Commonwealth Bank assume rediscounting functions and enabled to issue notes against bills presented for rediscount, the notes being cancelled when returned in repayment for remittance from abroad.

The final chapter on Economic Readjustment and Currency Policy, written in 1930, deals with the effects of low prices and high costs. The question of costs has taken on a special aspect in Australia, as in her great staple industries costs are largely accounted for by interest charges on land and are therefore but slowly adjustable. After considering various methods of dealing with the situation, Professor Copland concludes that the most hopeful line of attack is to induce a slight rise of prices by credit expansion, coupled with a fall in the exchange value of the Australian pound, though he fully admits the delicacy of the necessary adjustments and the difficulty of controlling the movement. W. A. E.

10.—*Exchange, Prices and Production in Hyper-Inflation; Germany,* 1920–23. By Frank Graham, Professor of Economics in Princeton University. 9″ × 6″. xix + 362 pp. Published for the International Finance Section of the Department of Economics and Social Institutions in Princeton University. Princeton University Press, 1930.

So much has been written on the subject of inflation in Germany that one is perhaps inclined to question whether any new book on this topic can be worth while. Professor Graham, in his comprehensive survey, has, however, brought together much valuable material and handled it with real originality. He is not content merely to produce facts and figures but seeks continuously to analyse the underlying forces which brought about the situations he describes. The first part of the book gives what he calls the historic background, and examines the different explanations brought forward for depreciation. He concludes that the necessity of paying reparations was the fundamental cause and considers it was bound to affect the exchange value of the mark, regardless of the volume of paper currency. To have upheld the internal value of the mark in these circumstances he regards rather as a theoretic than a practical possibility. When once depreciation had set in the effect of reparation payments was cumulative. Instead of giving rise to automatic forces which would decrease the country's indebtedness, as in normal circumstances a depreciating currency must do, every fall in the value of the mark increased the mark value of reparations and intensified the difficulties of the situation.

In the second section the author analyses the theory of prices and exchange rates in relation to the facts of the German situation. He is at pains to show that the quantity theory in its orthodox form is too inelastic and does not sufficiently allow for changes in the velocity of circulation. At times one has a certain sense of over-elaboration in his argument, and what he calls the orthodox doctrine is surely the orthodoxy of the past and not of to-day. Nevertheless, there is a great deal of interesting matter in this chapter, such as his computation of the gold value of the total circulation in Germany on the basis of purchasing power parities and his measurement of the rate of monetary turnover by the juxtaposition of the indices of wholesale prices and of total circulation. The other chapter of this section, which deals with the theory of exchange rates, is also very elaborate; it is, moreover, highly theoretical and hardly at all linked up with the actual situation in Germany.

The third section of the book gives various statistical measurements of the inflation and contains much suggestive material. It discusses, *inter alia,* the interesting question of the chronological sequence of movements in prices, exchanges, and the volume of circulation. Professor Graham's conclusion is that "while there is conclusive evidence that the movements of internal prices at times preceded those in the volume of circulating medium, there is no *absolute assurance* that the reverse situation ever occurred. Similarly, there is conclusive evidence that exchange rate movements at times preceded those of prices without any *certainty* that the contrary was ever true." He holds, however, that there is no clear case for the contention that exchange rates were steadily an even proximate determinant of internal prices. This statistical section includes also careful studies of the effects of inflation on different types of prices, *i.e.* import, export, and domestic commodity prices, and wholesale and retail prices, as well as on wages and the cost of living.

Finally, Professor Graham attempts to measure the general effect of inflation on German economy as a whole. He points out that the losses to certain sections of the community were so obvious that there was a tendency to under-estimate the gains in other directions. This was intensified by the low value put on capital goods, due in part to the general sense of insecurity and partly to the high rates of interest prevailing. Actually the industrial equipment of the country was considerably improved during the period of inflation, since it was a common practice to reinvest profits immediately in the particular business concerned in order to avoid the loss of value which any delay in distribution inevitably produced. Thus there was a gain to the community which was not fully reflected in capital values. These low values were in no sense an outcome of a low degree of industrial activity. Professor Graham has collected a large number of different indices of business activity which, taken together, clearly indicate that the inflationary period was not a period of depression for German industry.

In Chapter XIX the author deals with the question of the gains arising from the sale of money abroad. The sale of gold withdrawn from circulation and from the reserves of the Reichsbank was certainly a gain to the national economy. It is, however, incorrect to reckon the whole value of the gold exported as a net gain, since some of it was purchased back at a later date. Professor Graham does, it is true, eventually refer to this point, but only in the summary of his conclusions some twenty-five pages further on, and in the meantime the reader is left, quite unnecessarily, with an impression of inaccurate reasoning. The sale of gold was, however, small compared with the sale of marks, which, in view of the complete monetary debacle, did enable Germany to get something for what proved to be nothing. Taking the war and post-war sales together, the author, basing his calculations on the McKenna Report and on figures of the German Institute of Economics, concludes that the total gain was about 20 milliard gold marks (or, as he styles it, 20 billion. If only English and American were the same language !).

This study of gains from the sale of money is followed by a computation of counteracting losses incurred on foreign trade. Here Professor Graham's reasoning seems definitely at fault. Since the price of German exports was low compared with world gold prices, Germany was receiving less for her exports than she would have under stable conditions. This was not offset by a corresponding gain on imports, since these necessarily approximated more closely to world prices. Professor Graham computes the loss on this account by estimating what the gold value of Germany's imports and exports would have been at world prices and comparing the result with realized values. The estimate is elaborate and admittedly based in part on somewhat incomplete figures. In so far as it is reliable it gives the loss due to inflation on a *definite volume* of foreign trade, but this is not the same as saying that Germany lost this amount on her foreign trade as the result of inflation. Clearly, had it not been for the relatively low export prices the volume of foreign trade would have been entirely different. To take this additional sum which would have accrued had Germany conducted the self-same volume of trade at world prices (an impossible assumption), and place it as a debit against gains which were actually realized by the sale of gold and marks, as Professor Graham does, is an absolutely illogical proceeding.

The book, it will be gathered, is not without its faults. The author is rather too apt to explore every possible side avenue to his arguments and is perhaps rather too prone to treat rough estimates as definite valuations. Nevertheless, the work is unusually interesting and stimulating, and sets a high standard for the series, of which it is the first, to be published by the Department of International Finance of Princeton University. W. A. E.

11.—*Le Problème monétaire d'après-guerre et sa solution en Pologne, en Autriche, et en Tchécoslovaquie.* By Michel A. Heilperin, Docteur ès sciences économiques. Préface by William E. Rappard. Directeur de l'Institut Universitaire de Hautes Études Internationales à Genève. 9¾″ × 6″. xvii + 300 pp. Paris: Recueil Sirey, 1931.

M. Heilperin's book on post-war monetary problems in Poland, Austria and Czechoslovakia is a striking contrast to Professor Graham's study of German inflation, also reviewed in this *Journal.* Whereas the latter is chiefly concerned with underlying meanings and explanations, M. Heilperin is primarily a recorder of facts. It is true he starts off with a discussion of price theories and of foreign exchanges, but there is little more in this chapter than one would find in any good text-book on the subject, and it is highly improbable that readers, sufficiently interested in monetary problems to take up this volume, would find anything new to them in the author's handling of the general question. They can confidently be advised to miss out the first fifty pages. In the body of the book, on the other hand, there is a wealth of material and, at least in the Polish section, M. Heilperin is able to make direct use of authorities that for most of us must remain sealed books owing to the difference of language.

Though there is inevitably a certain sameness in the monetary history of all these three countries, with their unbalanced budgets and consequent inflation, yet each had its special problems. Both Poland and Czechoslovakia had to form a national currency. Poland was faced with the difficulty of replacing three distinct currencies, the mark, the rouble and the Austrian crown, whilst for Czechoslovakia the question was how to break away from the Austrian connection. The solution of these problems has, of course, been related elsewhere, but M. Heilperin gives a clear and interesting account of the course of events. Both these countries also show special features in their latter developments. In the financial history of Czechoslovakia the chief interest lies in the drastic deflation of the currency at an early stage of its independence. In Poland it is the second crisis after the original stabilization which will perhaps arouse most interest, a period of which the essential feature was the relative rise of internal as compared with external prices. It is in the section dealing with this latter phase of the Polish situation that M. Heilperin's handling of his subject is least successful. Certain points are entirely overlooked, and he curiously makes only passing references to some aspects of the case which would seem to call imperiously for fuller handling. Thus he deliberately refrains from dealing with the cause of the rise in internal prices. He outlines in this connection certain criticisms which were levelled against the methods adopted for stabilization, including the suggestion that the level at which the zloty was stabilized was too low. He is content to refer to a work (in Polish) by Mlynarski, who after "une analyse approfondie" appears to have demolished the case of those who brought up this criticism. But most of M. Heilperin's readers will never be able to study M. Mlynarski's profound analysis for themselves, and the point is too much the essence of the situation to be dismissed in this arbitrary way. The author also ignores entirely the effects of the drastic restriction of credit and the whole question of the position of the commercial banks, though the fact that they found a large proportion of their assets frozen is generally accepted as an important factor in the difficulties of 1925.

Apart from these omissions the chief criticism of the book turns on matters of detail and arrangement. M. Heilperin is undeniably slipshod in his definitions and headings. Thus, on p. 143 he gives a table of price indices in different countries. It is perhaps safe to assume that these are wholesale prices, though he does not say so, nor does he say which is the basic year from which the index-numbers are reckoned. Again, on p. 253 there are figures of the numbers unemployed in Czechoslovakia, but since every country has its own methods of measuring unemployment, and some measurements are more complete than others, one does need fuller information as to what exactly these figures represent. Other examples of a similar lack of definiteness could also be quoted. In general, however, the meaning of the tables is clear enough to anyone reading the text, but they are not headed in a way which makes them self-explanatory without reference to the text. In consequence anyone wishing to look up a particular table would find some difficulty in picking it out quickly. This is all the more unfortunate since there is no index to the book, other than the index to the chapters and subsections. It apparently did not occur to the author that his book would be of real value as a work of reference, and without an index and without titles to the tables its usefulness in this direction is unquestionably lessened.

We gather from the preface that this is M. Heilperin's first publication. If that is so, we hope that in his next work these matters of detail will be improved. Apart from these points, the book as a whole, although it does not show any special originality of thought, is a valuable and painstaking compilation.

W. A. E.

12.—*The Provision of Credit, with Special Reference to Agriculture.* By H. Belshaw, M.A. (N.Z.), Ph.D. With two chapters upon the provision of rural credit in Great Britain by R. R. Enfield. 8½" × 5½". xvii + 326 pp. Cambridge: W. Heffer & Sons, Ltd., 1931. 10*s.* 6*d.*

The provision of credit for agriculture has been a problem which has confronted the industry in all countries which have developed beyond the stage of a purely self-sufficing system. It is one which has features marking it off sharply from those of productive industry in general. In the first place, there is no concentration of the farmer's business in one locality or another, such as is found with manufacturing enterprise, although, of course, some branches of agriculture are less generally diffused than others. Then, the capital turnover is slower, for although it may take longer to build an Atlantic liner than to produce a quarter of wheat, the generalization would be true by comparison with many industries. Agriculture, again, is organized in one-man units. In most countries the joint-stock principle is unknown, and so it follows that the business organization of the farm has evolved less far, and credit-granting agencies have a task at once more difficult and more costly in dealing with the isolated units of an agricultural community than with the highly organized concentrated industries of the towns.

But to talk of the problem of agricultural credit is really to use a phrase that is loose and meaningless. Just as there is no such thing as an agricultural problem, for the reason that agriculture manifests itself in so many different forms, having varying and not infrequently conflicting interests not only in different countries but also within the same country, so the agricultural credit problem is impossible of statement or solution in general terms, by reason of similar essential differences between country and country and branch and branch. Granted that the need is common to them all, the security upon which credit must rest varies everywhere.

In some countries, or in parts of them, the one-man farm may be large and well-capitalized, with a good business system, and the credit position is analogous to that of any of the smaller industrial concerns. In others, the farming community may be largely a body of peasants occupying small farms as proprietors, and mortgage credit is obviously their first resource. In other peasant communities, tenancy rather than ownership may be the feature, and co-operative organization, designed to secure credit by the joint responsibility of all for individual loans, is developed. Or in the new countries, specializing largely in one commodity, such as wheat or wool, merchant interests which can calculate production and the probable course of prices may finance the farmers by forward purchases or by loans against production at various stages.

These are only a few examples, taken at haphazard, to illustrate the complexity of the agricultural credit problem, but they serve also to indicate the difficulty with which Mr. Belshaw has been confronted. Where there is no simple problem there can be no simple solution of it. Mr. Belshaw realizes this, and he has set himself, first of all, to a theoretical discussion of capital and credit treated in the abstract, as the lecturer on economics would treat it, and without any reference to agriculture. From this he passes to some considerations of "The Problem of Rural Credit" and a description of that which has been achieved or attempted by way of solution in selected countries.

This treatment of the subject makes the book difficult to place. The student of economic theory is not likely to feel much interest in the particular credit problems of agriculture, and, on the other hand, the student of agriculture will be rather restive under the abstractions of economic theory. The agriculturist does not need to be told of the complex organization of agriculture, and the economist will hardly be interested in the procedure for obtaining a loan for a farm water-supply in England from the Lands Improvement Company. The suggestion may be hazarded that Mr. Belshaw's book is the outcome of a postgraduate thesis, with the defects as well as the virtues of such compositions.

But his book contains much that is of interest and value. The discussions of the different types of credit required by the agricultural industry in different countries and under different circumstances, long-term, intermediate and short-term, are useful, and although the operations of the credit agencies selected as illustrations of the ways in which different countries try to meet these needs have been described before (Raiffeisen and Schultze-Delitzsch are surely household words by now), it may be convenient for some readers to have them in a collected form. English readers will be interested in Mr. Enfield's summaries of legislation to provide credit facilities both for landlords and for farmers during the past eighty years. Of this it may not be unfair to say that the facilities provided for lands improvement loans and for mortgage credit are adequate, but in so far as merchant credit and bank overdrafts are insufficient or otherwise unsatisfactory, the problem of the provision of short-term credit to finance the farmer's operations from season to season has still to be solved. C. S. O.

13.—*International Migrations.* Volume I, *Statistics*, compiled with Introduction and Notes by I. Ferenczi. 1112 pp. 1929. $10. Volume II, *Interpretations*, by a Group of Scholars in Different Countries. Edited by Walter F. Willcox. 715 pp. 1931. $7. New York: National Bureau of Economic Research, Inc. 9″ × 6″.

Volume I, which was first printed in May, 1929, contains the history and results of an enquiry into International Migrations undertaken by I. Ferenczi, and is really a more comprehensive investigation of this subject supplementary to his "Migration Movements" published by the International Labour Office at Geneva. The extensive nature of the enquiry is indicated by the fact that in Part II of this volume there are some 800 pages of statistics of migration relating to the countries covered by the enquiry. The national statistics embodied include those of the following countries:—*Europe*: Austria-Hungary, Balkan States, Belgium, British Isles, France, Germany, Italy, the Netherlands, Poland, Portugal, Russia, Scandinavia, Spain, Switzerland. *Asia*: British India, China, Japan.

Eight study tours were made after full preparation by correspondence with Government Departments and experts, and the archives and libraries of Europe were visited in order to examine their material. Much of the information collected is of historical rather than statistical interest. Here we can only refer to the general introduction and to the statistical particulars relating to the British Isles. The writer takes the broadest possible definition of an *emigrant* (p. 55), a definition which includes not merely all persons changing their residence from one country to another, but also all persons going from one continent to another with a view to residing there for over a year, even if the destination was a colonial possession of the country to which the migrant belonged. This definition corresponds fairly closely with that which has been used by the

British Board of Trade since 1st April, 1912, for the purpose of distinguishing migrants from and into the British Isles from other passengers. The collection and elaboration of the materials are explained on pages 56 to 66. A footnote on page 58 states that the recent official publications of the United Kingdom usually have not distinguished between emigration to Australia and that to New Zealand. The writer claims to have discovered such particulars, but they have been available and published by the Board of Trade since 1906, and reference to this subdivision of Australasian statistics is made later in the volume (p. 624). In the general introduction to the National tables (p. 69) the non-comparability of the twelve-month periods adopted by the various countries concerned is dealt with. Fiscal years have not been distinguished from calendar years, but information about the exact periods is given in the notes. When the fiscal year ends on March 31st or before, the figures have been classed as of the previous year, and when it ends after that date (generally June 30th) the figures are carried to the succeeding year. This procedure is justified by the assumption that migration is at its maximum in the spring.

In the paragraph on "Proletarian Mass Migration in the Nineteenth and Twentieth Centuries" it is shown that current official statistics began soon after the Napoleonic wars. For countries of emigration the British Isles led the way with statistics in respect of 1815, and for countries of immigration Canada was first with figures for 1816 (p. 81). The predominance of British among emigrants from Europe in the ninteenth and twentieth centuries is explained by the causes of emigration set forth in the paragraph quoted above and by the fact that the movement was to some extent assisted by the State. The number of emigrants from Great Britain between 1815 and 1924 is estimated at about 19 millions, while the total recorded emigration from Europe for the period 1820–1924 is shown as about 55½ millions. The figure of 19 millions represents all outward passengers from Britain for the period 1815–52 plus the number of British nationals outward from 1853 to 1924. It is assumed that the number of passengers other than British leaving this country before 1853 was small, and that from 1860 onwards about four-fifths of the British passengers were actual emigrants. It is of interest to note that protection of emigration by the State was first established by this country.

The general introduction to the international tables states that they have for their objects:

(*a*) To give through international comparisons a clear picture of the waves of migration in different countries; (*b*) to reveal the growth and spread of the methods and definitions of migration statistics and of the collection of information about immigrants; (*c*) to facilitate the future development of uniform statistical methods in all countries. To determine how far the object set out under (*a*) has been achieved would require an exhaustive study of the figures for each of the fifty-one countries and territories included. Looking at Table 1, entitled Intercontinental *Emigration* of Citizens (p. 230), the figures in respect of the British Isles are the total outward movement of British passengers prior to 1st April, 1912, from which date particulars of British emigrants are also included; similarly, in Table 9 (p. 240), entitled Intercontinental *Immigration* of Citizens, the figures for the British Isles are represented by the total inward passenger movement of British subjects. These figures of passenger movement have been used for Table 11, entitled Emigration of Citizens by Country of Future Residence. A figure is dropped on p. 241, for British Isles to British North America, 1871–75; the figure should be 111,415 not 11,415, and on p. 246 British Isles to Other Countries read 71,049 not 1,049. It remains a matter of conjecture how far the picture given by the tables is complete and accurate, but certainly the present difficulties of obtaining comparable statistics of migration are well illustrated in this volume. The qualifications to the international tables necessitate eight pages of footnotes.

Turning to the section of historical tables, in those relating to the British Isles (pp. 625–58) the writer has examined the shipping lists of emigration from the port of London in 1635, the weekly lists of emigrants established by the Custom House officers at certain ports in 1774 to 1776, and certain particulars of emigration from Scotland to North America and Virginia during 1774–75. Most of this information was known to be available in the Public Record Office, London.

The explanatory notes on pp. 619–25 were, in the main, furnished by the Board of Trade; there is one small point which needs further explanation. At foot of p. 622 appears the line, "Even to-day the particular nationality of alien passengers is not recorded." This is the case so far as the compilation of statistics by the Board of Trade from the passenger lists is concerned, but particulars of nationality are shown in the passenger lists, and the numbers of alien transmigrants who left or entered the United Kingdom, according to their nationality, have been collected and published by the Home Office since 1921 under powers of the Alien Restrictions Acts, 1914 and 1919. The departures of alien emigrants who have previously resided in the United Kingdom are not numerous and have not appeared to justify classification by nationality.

Volume II, *Interpretations*, has been published recently. This volume contains critical interpretations of the migration statistics of the countries which have sent out, or received, the largest number of migrants, in a series of studies prepared by persons who were especially familiar with these statistics. Part I deals with the increase in the population of the earth, and of each separate continent, since 1650, and one of the chief difficulties in forming estimates of this kind is presented by the divergent figures for China. The differences in opinion about the meaning and the weight to be attached to the Chinese return of 1910–11 are fully dealt with. Appendix 1 summarizes the estimates of world population prepared by various authorities.

Part II consists of studies of national *immigration* currents. The most important of these currents is, of course, immigration into the United States. This movement is dealt with very fully. It is of interest to note that the return current of aliens from the United States was not taken into account prior to 1908, but since that year an allowance in respect of this movement has been made in estimating the net immigration into the United States for earlier periods. Other immigration currents dealt with in this section are those in respect of Canada, Argentina, Brazil, Australia and New Zealand, with a chapter on migratory movement between France and foreign lands.

Part III contains studies of national *emigration* currents, those relating to Great Britain and Ireland covering fairly well-known ground. They were both compiled by Fellows of the Society. The European countries represented are Denmark, Norway and Sweden, Germany, Austria, Hungary, Italy and Russia. In each case the plan of the study follows somewhat similar lines; causes of emigration, occupation and social status, sex and age, marital condition of the emigrant, and monetary balance of emigration, being the principal sub-headings. These are, perhaps, sufficient indications of the scope of the studies in general. There is also a chapter on the international migration of the Jews, with some reference to the ill-fated immigration into Palestine in 1925. Indian, Japanese and Mexican migration are also dealt with.

The statistics in both volumes aim at covering the period from the beginning of the record in each country up to and including 1924, and in this connection the editor of Volume II says in his preface, "Those who have tried to establish a long series of comparable figures for emigration and immigration, year by year, will realize that the problem is difficult if not insoluble." With this remark few who are familiar with the subject will disagree. There are 270 statistical tables in this volume and a bibliography covering eleven pages.

T. P.

14.—*The Black Worker.* By Sterling D. Spero and Abram S. Harris. 8½″ × 5¾″. x + 509 pp. New York: Columbia University Press; London: H. Milford, 1931. Price 22s. 6*d*. net.

This book is the outcome of a study made by the authors under a grant of the Columbia University Council for research in the Social Sciences. "It is an effort to set forth descriptively and analytically the results of a study of the American labour movement in one of its most important aspects, namely, the relation of the dominant section of the working class to the segregated, circumscribed and restricted Negro minority."

The work begins with an account of the position occupied by the negroes in the United States just before and immediately after their emancipation. In the slave-owning days the masters had some of their negroes trained in skilled occupations, such as carpentry, masonry, blacksmithing. Not only did these men do work on the estates to which they belonged, but many of their masters made profit out of them by hiring them out for work in the towns. It has been estimated that, in 1865, there were 100,000 negro mechanics in the south as compared with 20,000 white ones. As a result of the emancipation of the slaves, "The negro artisan previously trained and contracted out by his master, and the negro labourer were projected into the free labour market in competition with white men. Negro competition was intensified by the fact that negro labour was forced to accept lower wages than white and was frequently drawn upon for strike-breaking by northern industrialists."

With the growth of trade unionism among the whites the numbers of negro artisans tended to decline because they were in many cases excluded from the unions or admitted only in local branches composed wholly or mainly of negroes. A considerable portion of the book is devoted to detailed accounts of the vicissitudes in the position of the negroes in various industries from the late 'sixties of the nineteenth century to 1930. Strike-breaking occupies a rather prominent place in these accounts. "The negro's willingness to break the white man's strike is partly traceable to his slave-time distrust of white labour and his dependence on the white master class. Primarily, however, the negro's availability as a strike-breaker has been due to his complete ignorance not only as to what a strike or a union was. but even of what a factory was. Most of the coloured labour used to break strikes came straight from the farms without any previous industrial contacts."

The steady flow of negroes from the southern to the northern states which had been going on for many years was much increased during the Great War. At the end of the war "foreign immigration was restricted and the northward trek of negro labour continued until 1924." We are told that most of these people went to the industrial centres of the north and middle west. The majority of them became unskilled or semi-skilled operatives in steel mills, motor-car works, foundries and packing houses, while many went to road-making and other construction jobs.

Some tables are given showing the numbers of negro members of various trade unions, and others showing the number of negroes employed in certain occupations according to the 1920 Census, but corresponding particulars of white workers are not shown, and this omission weakens the interest of the figures.

In certain occupations in which considerable numbers of negroes have been employed and have been excluded from membership of the white trade unions, independent negro unions have been formed—notably in the railway service. In 1919, when interest in the organization of negro workers became widespread, the American Federation of Labour arranged for the formation of the excluded negroes into local unions affiliated with the Federation, but "such independent locals without the support of the international of the craft can neither protect the interests of their members in their relations with employers nor bring sufficient pressure on the discriminating international to force it to change its policy. There is no more effective illustration of this than the very short life of coloured federal unions. There were 169 such locals in 1919 when the American Federation of Labour was urging their formation as a solution for its negro problem. In September 1929 there were but 23, exclusive of 13 locals of Pullman porters."

One of the obstacles to the unionization of negroes is their traditional loyalty to their employers. Our authors give, as an example of this attitude, the story of a negro employed in the Chicago stockyards who was told by a union organizer of the advantages of union membership. "It all sounds pretty good to me," said the negro, "but what does Mr. Armour think about it?"

Messieurs Spero and Harris have performed their task thoroughly and their book may be read with profit by all who are interested in problems arising out of the juxtaposition of white and coloured labour, whether in the United States or elsewhere. J. W. V.

15.—*The Slum: Its Story and Solution.* By Harry Barnes, F.R.I.B.A., F.S.I. 8½″ × 5½″. xv + 398 pp. London: P. S. King & Son, Ltd., 1931. Price 18*s.*

"What the past has begun it is for us to continue and complete. That strain in men which sets them to improve on what has gone before is not spent, and this generation will not differ from their forbears in giving it bent. To this practical end this book is written. For no dilettante pleasure or academic interest, but so to force attention that action will follow is the motive that drives my pen. People can be housed decently, and people must be housed decently. It is a disgrace that they are not, and a duty to ensure that they are."

This, the author's *apologia,* is perhaps sufficient to show that this book will appeal less to the research worker than to the layman in search of some knowledge of the past and present problem of housing. The latter will find plenty of information here. The author traces the beginnings of the Public Health Acts, interspersing his text with plentiful quotations illustrative of the foul sanitary conditions against which they were directed; passes to the Acts more directly bearing on housing—the Torrens Act of 1868 and the Cross Act of 1875—and to the work of the social reformers of the nineteenth century, such as Edwin Chadwick, Lord Shaftesbury, George Peabody, and Octavia Hill; quotes extensively from the evidence collected by the two Royal Commissions on Housing in 1844 and 1885, and their recommendations; and discusses the achievements—or absence of achievements—of such bodies as the Vestries, the Metropolitan Board of Works, the Commissioners of Sewers, and the London County Council. Coming to more recent times, an account is given of the Parliamentary Committees of 1906 and 1912 and of the Housing and Town Planning Acts of the twentieth century. How much remains to be done is shown by quotations from the reports of Medical Officers of Health in the Metropolitan Boroughs and provincial cities in 1928 and 1929. There is no dearth of material and the author omits no important sources. A great deal of the book can be skimmed; the story, so the preface says, is "humanized by some account of those who have been leaders in the fight." This seems to consist of a somewhat indiscriminate use of the mark of exclamation, and of dozens of "chapters" but a page or two in length—"Peers and Parlours," "Prince and Prelate," "Crowded Beds and Broken Ribs."

Part II is devoted to the solution of the present-day problem, and deals with transport, town planning and zoning, repair, acquisition and compensation, the question of higher buildings, the resources and the authorities to administer them. The author seems on happier ground here than in the historical section. He goes straighter to his point, does not minimize the difficulties involved but discusses them interestingly, recognizing that the introduction of reforms, which no sane person can wish to see delayed, must unfortunately be still a slow process. He concludes that just as the supply of elementary education has been made compulsory, so the provision of suitable housing in every district must be made compulsory. A. B. H.

16.—*Essai sur la Nature du Commerce en Général.* By Richard Cantillon. Edited with an English translation and other material by Henry Higgs, C.B. 9¼″ × 6″. 389 + viii pp. London: Macmillan Co. for the Royal Economic Society. 1931. 15*s*.

Let us add: embellished with two portraits, the one of Madame Cantillon *née* Mahony, by Largillière, N.D., which is the frontispiece ot the whole book, the other of Cantillon's daughter, Henrietta Countess of Stafford, by Allen Ramsay, 1757, frontispiece of the Life and Work of Cantillon, pp. 363 foll., by the Editor. The second portrait is the more pleasing. No portrait of Richard Cantillon himself has yet been found.

The Harvard edition of the *Essai*, 1892, with a Preface by Mr. Higgs, was a small duodecimo in green cloth, and, though very welcome at the time, is now out of print and rare. From the fulness of materials provided, and even from the greater ease of reading a book that will lie open, as well as from the English translation facing the original, page by page in the new volume, Harvard itself would probably acknowledge the precedence of the latter over its own. It is an *édition de luxe*, of which there are few instances in our economic books. The Royal Economic Society has made a valuable addition to its publications, and Mr. Higgs to his already established literary fame.

The search after the real author of the *Essai*, begun by Stanley Jevons in 1881, has been pursued by Higgs, with such keenness and assiduity, over the entire range of French, English, Irish, and Dutch authorities, that even for so well-equipped a rival as Dr. Friedrich R. Hayek there is little left to discover.*

Like Christopher Marlowe, Richard Cantillon had many "doubles"; and, like him, Cantillon had a life of mystery and a tragic death by violence. As Mr. John M. Robertson cleared up the biography of the dramatist, Mr. Henry Higgs has cleared up the biography of the economist.† Like Ricardo and Goschen and unlike Adam Smith, Cantillon was himself a man of business. His Paris contemporaries, including John Law (see Higgs, pp. 336, 368), feared his shrewdness and called him a hard bargainer, but he seems always to have kept within the letter of the law. After living and moving among Bubbles, he contrived not only to make a fortune but to keep hold of it (Higgs, p. 381). Finally, in 1734, having crossed to London, he was murdered there by his cook (pp. 337, 374). He was not a Frenchman but a born Irishman from Kerry; and he is believed to have left an English version of the *Essai*. It is at least certain that before 1755, when the book was printed at Paris,* it had been known and read in manuscript not only in France but in England. In France the recognition of its value was unmistakable (Higgs, Append. B, p. 391 foot), and there were expressions of regret for the disappearance of a Supplement mentioned in it, p. 70; cf. p. 382: "In the Supplement will be found the estimates of the amount of land required for the support of a man according to the different assumptions of his manner of living." It is supposed to have included a study of Workmen's Budgets (p. 385). Mr. Higgs in his Harvard Preface calls it "a Statistical Supplement" (iv).

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* See his learned Preface to Mrs. Hayek's German translation of the *Essai*, Gustav Fischer, Jena, 1931.

† Pp. 361 foll. Compare Robertson's *Marlowe*, pp. 8 foll. (Routledge, 1931).

But more than enough for fame was left in that single *Essai* of barely 400 pages duodecimo. It gave for the first time a really systematic treatise on Political Economy, embracing nearly all of the general features now included in every economic handbook as a matter of course, but not so handled then. He writes briefly and succinctly as if he were otherwise fully occupied and could only spare time to set down (it is said for a French friend, Harvard, ii, present vol. p. 337) what was essential and nothing that was not essential. One subject, Taxation, is by him (as by Malthus) hardly touched at all.† Yet the physiocrats, who did much more than touch it, traced their origin to Cantillon. Vital statistics may be said to appear in the allusions to Halley and his Breslau figures (pp. 33, 78). The single allusion of Adam Smith in the *Wealth of Nations* (I. viii.) to Cantillon ("Mr. Cantillon seems upon this account to suppose that the lowest species of common labourers must everywhere earn at least double their maintenance," etc.) was a mistake, for Cantillon expressly says (Higgs, pp. 42, 43; cf. pp. 38, 39) he is quoting Petty, who was sketching his theory of a Par between land and labour in the matter of Value (Petty's *Taxes and Contributions*, 1662, Ch. IV, § 18). It was a fortunate mistake, for it made at least the name of Cantillon familiar to English readers. Petty himself has special interest for this *Journal* as he is the recognized originator of Statistical Science. (Higgs, p. 347.)

Were there any spots on the sun? The warm admiration of his editors would leave Cantillon almost faultless. A fresh reader not so completely carried away will probably stumble over the Physiocratic passages, especially the conclusion of Chapter XIII: "I will then lay it down as a principle that the Proprietors of Land alone are naturally independent in a State, that all the other Classes are dependent, whether Undertakers [*entrepreneurs*] or hired, and that all the exchange and circulation of the State is conducted by the medium of these Undertakers" (pp. 56, 57). Our fresh reader will also stumble over the most brilliant chapters of all, in Cantillon's second Part which deals with Money and Exchange. We read (p. 243) that "the trade most essential to a State for the increase or decrease of its power is foreign trade, that the home trade is not of equally great importance politically, that foreign trade is only half supported when no care is taken to increase and maintain large merchants who are natives of the country, ships, sailors, workmen and manufactures, and above all that care must always be taken to maintain the balance against the foreigner." "The Indian manufactures consumed in Europe only diminish our money and the work of our own manufactures" (p. 237). "If by abundant harvests it happened that there was in the State much produce over and above the ordinary annual consumption, it would be profitable to encourage the exportation of it in return for its value in gold and silver. These metals do not corrupt and disappear like the produce of land, and with gold and silver one can always import into the State what is lacking there" (pp. 232–5). Are we to set such passages down as obsolete Mercantilism or as rediscovered old truths? The answer will vary with our views of the present English situation. It is hard even for the sturdiest economists to raise their heads above the billows of contemporary politics.

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* In a disguised form. See Higgs, p. 341.

† There are references, pp. 128, 158, 189, 235.

What should we say to the doctrine on pp. 234–5?:—"States who rise by trade do not fail to sink afterwards. There are steps which might be, but are not, taken to arrest this decline." Adam Smith, too, fell into a doubtful forecast:—"The progress of the enormous debts which at present [1776] oppress and will in the long run probably ruin all the great nations of Europe has been pretty uniform" (*Wealth of Nations*, V. iii, near the beginning). Yet we are told that the same authority reminded the pessimists of his own day that "there was a great deal of ruin in a nation." He meant that it would take more than a surrender at Saratoga to ruin the Britain of the eighteenth century; and we may be sure it will take more than the Dole or the Debt to ruin the Britain of the twentieth. But, in the words of Cantillon, "steps must be taken to arrest the decline."

J. B.

17.—*Other New Publications.**

Abbott (W. Barrie). Income Tax Summarized. 8¼″ × 5¼″. 100 pp. London: Gee & Co., 1931. 4*s.* 6*d.*

[This volume is an expanded version of "concise notes on income tax" originally prepared for the use of students taking the Chartered Accountants' final examination, and the author's object is "to provide a summary of existing law and practice sufficient for the examination student and the ordinary practitioner." The book is in summary form, the information being given in short headed paragraphs. The first chapter, "Introductory Notes," consists of definitions and explanations of terms, *e.g.* Finance Acts, Assessor, Statutory Income, etc., and includes explanations of all the various kinds of allowances, categorically set out, with examples of their calculation. The succeeding chapters deal in turn with the several schedules, with the methods of assessing businesses which have newly arisen, ceased, or changed in form, claims for losses, taxation at the source, trusts and annuities, repayment claims, sur-tax, residence and Dominion tax, and various special matters. The index is full enough to enable any particular point to be referred to at once and the book appears to be altogether most useful for reference purposes. It was, however, issued before the passing of the second Finance Act of 1931.]

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* *See also* "Additions to Library," p. 167.

Andréadès (*A.*). La Population du Japon. 9¼″ × 6″. 52 pp. (Extrait de la Revue Économique Internationale, Janvier, 1931.) Bruxelles: Goemaere, 1931.

[The Tokyo meeting of the International Statistical Institute in 1928 gave the author the advantage of viewing his subject-matter in the round, so to speak, with the result that in this brief survey of the population of Japan the facts underlying the census figures have been presented as an informing sketch of Japanese social conditions. The study is prefaced by a brief recapitulation of the main facts of Japanese history and is divided into two parts. The first reviews the demographical history from the seventh century to the imperial restoration of 1868, and is mainly an introduction to the second. This deals with the period from 1868 onwards, during which Japan has become industrialized in the Western sense, with the inevitable concomitants of urban expansion and overcrowding, one conspicuous effect of which is that Greater Tokyo now ranks as the third largest city in the world. The occupational distribution of the 1920 census, however, showed that agriculture then still employed well over one-half of the occupied population and nearly twice as many persons as were employed in manufacturing industry. The study is carried down to 1929, but since the full census is only taken decennially the distribution figures were considerably out of date when the paper was written; M. Andréadès's commentary and explanations of their significance should, however, be useful when the results of the 1930 census become available.]

L'Assurance-Chômage: cause du chômage permanent. Préface de *Charles Rist.* 10″ × 6½″. viii + 46 pp. Paris: Recueil Sirey, 1931.

[This study, which is commended by Professor Charles Rist in his preface, is reprinted from the *Revue d'Économie Politique* for March–April, 1931. Although the author is not named, he is apparently M. Jacques Rueff, who contributed an article on the same subject to a French periodical in December, 1925. The author maintains that figures of the period under review in this second paper confirm his earlier assertion that unemployment insurance has been largely responsible for the present state of unemployment in Great Britain, by enabling workers to resist wage reductions and so prevent the adjustment of industry to post-war conditions. The argument is illustrated by a diagram containing the curves of the percentage of unemployment and of the ratio of wages to wholesale prices in this country from 1919 to 1930.]

Furnival (*J. S.*). An Introduction to the Political Economy of Burma. 7¼″ × 5¾″. xxvii + 255 pp. Rangoon: Burma Book Club, Ltd., 1931.

[This book, written at the instigation of Professor Jevons, who contributes an Introduction, embodies the subject-matter of a course of lectures given to classes in University and Judson Colleges, and is intended primarily for Burman readers. The eleven chapters include studies of the wealth and revenue of Burma, its crops and cultivation, trade and industry, an interesting description of social life under Burmese rule, and a review of the economic development of modern Burma with especial attention to the reclamation and settlement of the Delta. The three appendices contain respectively Burmese revenue records, miscellaneous statistics, and a note on assessment of land revenue.]

Garnsey (*Sir Gilbert*). Holding Companies and their published Accounts. 2nd ed. 8¼″ × 5¼″. 315 pp. London: Gee & Co., 1931. 15*s*.

[The first edition of this book, published in 1923, was briefly noticed in the *Journal* for 1924. At that time Holding Companies were governed by the same rules as other joint stock undertakings. In the present edition the special provisions affecting them included in the Companies' Act of 1929 are given in detail at the outset, and are discussed in the subsequent chapters. A chapter (IV) has been added on the Organization of Direction and Management of a Holding Company, and the whole, besides having been generally revised and brought up to date, has very properly been completed by the addition of an index.]

Clare (*George*). A Money Market Primer and Key to the Exchanges. 3rd ed. Revised by Maurice H. Megrah. 8½″ × 5¼″. 287 pp. London: Effingham Wilson, 1932. 6*s*.

[Clare's well-known primer has been capably and judiciously brought up to date by the Assistant Secretary of the Institute of Bankers, who has joined his flats so skilfully that no one reading the book for the first time would suspect two authors. The greater part of the text is untouched; new paragraphs complete the account of each division of the subject by a description of the alterations which have taken place since the war and of the conditions which now obtain, and space has been saved for these by the omission of detail relating to past periods. A whole chapter has been added on the period 1914–18 :—the War and its effects. The charts, all of which related to the period ending 1890, have been omitted altogether; the chapters, still twelve in number though a little differently apportioned, are subdivided by headlines; the size of the book remains the same, but the print is much larger.]

League of Nations: Economic Intelligence Service. Statistical Year Book, 1930–31. 9¾″ × 7½″. 292 pp. Geneva, 1931. Cloth 10*s*. Paper 7*s*. 6*d*.

[This is the latest edition of the annual, formerly entitled the International Statistical Year-Book, and last issued in 1929. The scope has been enlarged; the volume now includes several maps, and the tabular information covers a wider range of subjects, notably unemployment by groups of industries, strikes and lock-outs, yields of bonds, index-numbers of shares, and discount rates. The statistics are carried down to a satisfactorily recent date; most of the tables include the figures for 1930.]

O Brasil Actual. 10¾″ × 7″. 174 pp. Ministerio da Agricultura Industria e Commercio. Rio de Janeiro. 1930.

[The Institute for Commercial Expansion, which is a sub-department of the Brazilian Ministry of Agriculture, Industry, and Trade, exists for the study and dissemination of the facts relating to Brazilian produce and resources; and this volume is a compendium of such information, in parallel columns of Portuguese and English. It would be easier to summarize the contents if there were a classified list of headings, and a better index might well be provided. In other respects it is an attractive publication and should be a useful one. The area, climate, population, natural products, foreign trade, finance, communications, immigration, and power production of Brazil are dealt with in separate sections and sub-sections by means of brief description, copious tables, interesting photographs, and ingenious coloured graphs, which, according to a hasty count, occupy thirty whole pages (one, at least, containing nine separate graphs). The figures are presumably official; they are very detailed, and the tables incidentally furnish the reader with a Portuguese-English glossary of commodities of all kinds. Coloured charts show the geographical distribution of products, and a large folding map of Brazil is included.]

CURRENT NOTES.

On another page we give our usual table summarizing the overseas trade of the United Kingdom for the two years 1930 and 1931. The gross imports during 1931 were valued at £862,175,000 and retained imports at £798,140,000, or 82·6 per cent. and 83·4 per cent. respectively of the corresponding values recorded in 1930. Retained imports of food, drink, and tobacco were less in value than in 1930 by 12·1 per cent., raw materials by 30·4 per cent., and manufactured goods by 13·7 per cent. These reductions were mainly if not altogether due to the fall in prices which has characterized the last two years. The aggregate of all kinds of grain and flour imported and retained showed an increase in quantity, notably wheat and maize. So too did meat, especially mutton and bacon. Butter and most kinds of fruit showed increases, but fish, cheese, and eggs showed small reductions. Imports of potatoes rose from 289,000 tons in 1930 to 829,000 tons in 1931, half the latter quantity coming from Germany and the Netherlands. There was a small decrease in retained imports of tea and a larger reduction (4·1 per cent.) in those of raw sugar. On the whole it is plain that bad trade did not interfere last year with the provisioning of the United Kingdom.

With regard to raw materials, retained imports of raw cotton (10·5 million centals) continued the fall which has been going on for some years and were about 8 per cent. below those for 1930; American cotton formed only 47 per cent. of the total imports, as compared with 63 per cent. in 1929. On the other hand, retained imports of sheep's wool continued to rise and at 592 million lbs. were nearly half as much again as in 1924. Raw silk, flax, hemp, and jute also showed respectable increases on 1930, but there was nearly a 44 per cent. fall in silk cocoons, waste, etc. Linseed, copra, ground-nuts, wet hides, pig and sheet lead, and crude zinc showed increases over 1930, but there were declines in phosphate of lime, iron ore (nearly a half), copper ore, tin ore, iron pyrites, timber, dry hides, and rubber.

Imports of articles wholly or mainly manufactured were seriously affected during the second half of 1931, first by exceptional importations in anticipation of new duties, and, secondly, by the imposition of duties on a variety of goods. The working of the Abnormal

Importations (Customs Duties) Act is shown by the decrease of about £10 million in imports of this class in December as compared with November. Iron and steel and manufactures thereof were not made dutiable, but as the retained imports were over 41 per cent. greater in tonnage in the fourth quarter of the year than in the third, it appears reasonable to assume some anticipatory importation. Retained imports of iron and steel in 1931 aggregated 2,845,000 tons, 55,000 tons less than in 1930 and 32,000 tons more than in 1929. Over 58 per cent., or 1,660,000 tons, consisted of crude iron and steel, about 8·3 per cent. more than in 1930, while other classes of iron and steel decreased. There was a decrease in 1931 of about 13 per cent. in retained imports of machinery, and of over 4 per cent. in refined petroleum, but an increase of 38 per cent. in woollen and worsted tissues and little change in cotton piece goods. There was a remarkable decrease, from 11,279 to 3,608, in retained imports of motor-cars and chassis. British exports at £389 million were about 32 per cent. less in value than in 1930; food, drink, and tobacco (£35·5 million) and raw materials (£47·1 million) each declined by 26·3 per cent. and manufactured goods (£290·6 million) by about one-third. Exports of coal fell from 54,874,000 tons in 1930 to 42,750,000 tons, and constituted 8·9 per cent. of the total value of British exports in 1931 as against 8·0 per cent. in 1930. There was also a fall from 15,617,000 tons to 14,610,000 tons in shipments of bunker coal for the use of steamers in the foreign trade and fishing vessels. The Board of Trade has calculated that exports of iron and steel formed 9 per cent. of the total value of British exports in 1930 and 7·8 per cent. in 1931, and that, "adding iron ore and scrap, cutlery, hardware, tools, machinery, and vehicles (except rubber tyres), the contribution to the total value of British exports was £149·8 million (26·3 per cent.) in 1930 and £91·9 million (23·6 per cent.) last year." British exports of iron and steel were only 1,981,000 tons in 1931, 3,160,000 tons in 1930, and 4,380,000 tons in 1929. Retained imports exceeded exports, but the different character of the imports and the exports must be remembered, finished products constituting 69·5 per cent. of the exports and only 11·4 per cent. of the imports. Exports of all the important classes of finished products were less in 1931 than in 1930, but there was a distinct increase in the fourth quarter of 1931 over the third. There was a heavy falling-off in exports of machinery from 481,900 tons in 1930 to 328,400 tons in 1931, but there was a significant increase in the exports of machine tools in December. Exports of motor-cars fell from 29,700 to 24,300.

Again quoting from the *Board of Trade Journal* (January 14, 1932) :—" In 1924 textile exports formed 38·9 per cent. of the total value of British exports, but this proportion has been declining in recent years, being 31·3 per cent. in 1929, and 26·5 per cent. in 1930, and last year shows a further decline to 25·5 per cent. Cotton exports fell from 18·7 per cent. of the total in 1929 to 15·4 per cent. in 1930, and to 14·6 per cent. in 1931. Exports of wool and manufactures thereof, which declined from 8·6 per cent. of our total domestic exports in 1929 to 7·3 per cent. in 1930, maintained the same proportionate figures in 1931 as in the previous year." Exports of cotton yarns, wool tops, wool yarns, and pure silk goods were fairly well maintained in 1931 as compared with 1930, and there was a small increase in linen piece goods, but cotton piece goods fell from 2,407 million square yards in 1930 (34 per cent. below 1929) to 1,716 million square yards in 1931, a further fall of 29 per cent. Exports of cotton piece goods to India fell from 1,374 million square yards in 1929 to 778 million in 1930, and to 390 million in 1931. Exports of woollen and worsted tissues fell from 155,500,000 square yards in 1929 to 113,700,000 square yards in 1930, and to 86,000,000 square yards in 1931.

Among other groups of exports, chemicals in the main were greater in the fourth than in the third quarter of 1931 (except sodium compounds), and so too were paints, paper and cardboard, boots of leather, stockings of wool and artificial silk, linoleum and oilcloth, and glass bottles; exports of electrical goods and apparatus were practically the same in value in each of these two quarters so that the volume was probably greater in the fourth quarter. In all these classes of goods, as well as in pottery and plate and sheet glass, exports were less in quantity in 1931 than in 1930. Domestic exports as a whole were slightly higher in value in December than in November, 1931, thus reversing the records of the preceding four years, when the total for December was lower than that for November by over 10 per cent.

Taking the year as a whole, the excess of imports over exports of merchandise was £381,714,000 in 1929, £386,385,000 in 1930, and £408,976,000 in 1931. There was an excess of exports of bullion and specie amounting to £15,930,000 in 1929, an excess of imports of £5,026,000 in 1930, and an excess of exports again in 1931 of £32,777,000. There was, consequently, an excess of imports over exports of merchandise, bullion, and specie amounting to £365,784,000 in 1929, to £391,411,000 in 1930, and to £376,199,000 in 1931.

Movements and Classes.	Twelve Months ending December, 1930.	Twelve Months ending December, 1931.	Increase (+) or Decrease (—).
Imports, c.i.f.—	£'000.	£'000.	£'000.
Food, drink, and tobacco	475,116	416,999	— 58,117
Raw materials and articles mainly unmanufactured	250,459	173,367	— 77,092
Articles wholly or mainly manufactured ...	307,418	261,972	— 45,446
Other articles	10,982	9,837	— 1,145
Total Imports ...	1,043,975	862,175	—181,800
Exports, f.o.b.—			
United Kingdom Produce and Manufactures—			
Food, drink, and tobacco	48,219	35,529	— 12,690
Raw materials and articles mainly unmanufactured	63,760	47,092	— 16,668
Articles wholly or mainly manufactured ...	440,042	290,573	—149,469
Other articles	18,735	15,970	— 2,765
Imported Merchandise—			
Food, drink, and tobacco	23,756	20,163	— 3,593
Raw materials and articles mainly unmanufactured	38,369	25,767	— 12,602
Articles wholly or mainly manufactured	24,075	17,497	— 6,578
Other articles	635	608	— 27
Total Exports ...	657,591	453,199	—204,392
Bullion and Specie—			
Imports	95,177	106,798	+ 11,621
Exports	90,151	139,575	+ 49,424

Movements of Shipping in the Foreign Trade—	Number of Vessels.	Thousand Net Tons.	Number of Vessels.	Thousand Net Tons.	Number of Vessels.	Thousand Net Tons.
Entered with cargoes—						
British	31,109	40,788	29,242	38,212	—1,867	— 2,576
Foreign	26,201	22,928	25,775	22,088	— 426	— 840
Total entered ...	57,310	63,716	55,017	60,300	—2,293	— 3,416
Cleared with cargoes—						
British	38,428	42,620	35,685	38,164	—2,743	— 4,456
Foreign	22,682	23,233	19,711	20,176	—2,971	— 3,057
Total cleared ...	61,110	65,853	55,396	58,340	—5,714	— 7,513

The calculations regarding the volume and value of our overseas trade in *The Board of Trade Journal* for January 21 are of particular interest in that they introduce a new basis of calculation, the year 1930. Imports and exports are calculated for 1924 and 1930, first on the basis of 1924 and then on the basis of 1930. "The broad result of the revaluation at the average values of the later year is an increase of about 1 per cent. in the quantity of goods imported and a decrease of nearly 3 per cent. in the volume of domestic exports as compared with the results obtained from estimating the trade of both years at the average values of the year 1924. While the divergent changes in the average values in the different groups in the two years are mainly responsible for the altered figures, the changes within some of the groups have in certain cases an effect which cannot be neglected." Retained imports showed the following changes in volume in 1931 compared with 1930:—Food, drink, and tobacco, +8·2 per cent.; Raw materials, —6·1 per cent.; Manufactured goods, +1·7 per cent.; All articles, +2·9 per cent. The following were the changes in the volume of British exports:—Raw materials, —17·9 per cent.; Manufactured goods, —25·8 per cent.; All articles, —23·8 per cent. The average value of retained imports fell by 19 per cent. in 1931 and that of exports by 10·6 per cent.; the fall in the value of imported raw materials was 25·9 per cent. and in exported manufactures 11 per cent., while imported manufactures retained fell 15·1 per cent. in average value. The serious position of export trade is further shown by the fact that the average value of coal in 1924 was 40 per cent. above that in 1930, of manufactured goods 20·5 per cent., and of all articles 20·8 per cent. The average value of retained imports in 1924 was 35 per cent. above the level of 1930, including food, etc. 35·5 per cent., raw materials 53·3 per cent., and manufactured goods 22·5 per cent.

Over the year 1931 *wholesale prices*, as measured by the Board of Trade index-number, show a fall of 12·9 per cent. as compared with 1930. The fall was continuous up to September 20, but since that date prices generally have improved, and for the month of December, 1931, the index-number was the same as for March. There has, however, been some slight decline since about the middle of November, when prices generally were 8·4 per cent. above those for the period September 1-19, but during the last week of December prices were still 7·8 per cent. over those for the first three weeks in September. The index-numbers since July, 1931, are shown below.

AVERAGES FOR YEAR 1924 = 100.

Period.	Total Food.	Total Not Food	All Articles.
August, 1931	64·8	57·3	59·9
September, ,, ...	64·9	57·0	59·7
October, ,, ...	67·8	60·2	62·8
November ,, ...	69·0	61·4	64·0
December ,, ...	67·8	61·5	63·7
Year 1931	67·2	60·3	62·6
,, *1930*	*76·1*	*69·6*	*71·9*
,, *1929*	*87·4*	*79·4*	*82·1*

The only group of products which did not show a rise in price when the gold standard ceased to govern currency issues was that for meat and fish, where the decline in price has been practically continuous throughout the year. The greatest fall has been in the prices of bacon, which in December 1931 were more than 30 per cent. lower than in December 1930. British mutton, however, fell as much as 27 per cent. over the same period.

In spite, however, of the general rise since September the change has been considerable in one group only—cereals. Here, though the index-number for 1931 is nearly 18 per cent. below that for 1930, the figure for December 1931 is 15 per cent. above that for September 1931. Coal, tin, spelter and jute are commodities the prices of which are higher than a year ago. Jute has increased by more than 30 per cent. and tin by nearly 23 per cent. The poor yield of this year's British crop of potatoes has already caused an increase of nearly 40 per cent. over the wholesale prices in December, 1930, and it is not likely that this is the limit of the advance.

If the average prices for 1913 are taken as 100, the index-number for 1931 shows a general rise of just over 4 per cent. (104·1). Cereals (89·8), metals and minerals other than coal and iron (78·2), cotton (96·8) and other textiles (except wool) (80·5) are all below the level of 1913. The index-number for wool is at the same level. The other groups are at a level above that for 1913; meat and fish (116·5), other food (131·1), iron and steel (104·9), coal (122·4), and other miscellaneous articles (105·6).

The *Economist* index-number, which stood at 62·5 at the end of July (1927 = 100), declined to 62·3 at the end of August, and by September 18 had fallen to 60·4. At the end of September it had recovered to 65·1 and to 65·5 at the end of October. At the end of December the figure was 65·8, indicating a rise of 8·9 per cent. since the sale of gold by the Bank of England at a statutory price ceased to be obligatory. The rise was greatest in textiles, 20·8 per cent. and in minerals, 13·8 per cent. For cereals and meat the rise was about 7 per cent. The index-number for the end of the year (65·8) showed a decline of 4·2 per cent. compared with a year ago.

The general trend of prices as measured by the *Statist* index-number varies slightly from that shown by the Board of Trade and *Economist*, in that the slight fall about the end of November is not recorded. The index-number for August was 79·1 (1866–77 = 100), and a continuous rise in the groups both of food-stuffs and raw materials lifted the figure to 85·4 in December, a rise of 7·9 per cent. The index-number, however, is still below that for a year ago by 1·7 per cent.

The rise since the end of August shown in all the three index-numbers may to some small extent be due to seasonal variations, but nearly all of it can be attributed to the depreciation in sterling. It is noticeable that in the two gold standard countries, France and the United States, there has been a decline in prices since August last. The prices at August and December, 1931, are given hereunder.

	Board of Trade. 1924 = 100.	*Economist.* 1927 = 100.	*Statist.* 1866–77 = 100.	U.S.A. (Bradstreet). 1913 = 100.	France (*Stat. Gen*.). 1913 = 100.
August, 1931 ...	59·9	62·3	79·1	92·2	455
December, 1931	63·7	65·8	85·4	83·9	413

According to the index-number of *shipping freights* compiled by the Chamber of Shipping and published in the *Statist*, there was an improvement in freight rates during the last three months of 1931 of over 15 per cent. compared with the rate obtaining in September. There was some slight decline in December, but the rate in that month was still nearly 1 per cent. higher than in December, 1930, and considerably higher than in the first nine months of 1931, when the mean of the monthly index-numbers was 19·4 (1920 = 100) compared with 21·5 for the last three months.

The depreciation in the *value of securities* during 1931, as shown in the *Bankers' Magazine* index-numbers of Stock Exchange Values, was very considerable, amounting to as much as 13·9 per cent. between December 1930 and December 1931. The depreciation was 9·2 per cent. in the fixed interest stocks included in the index-number and 23·5 per cent. in the variable dividend securities. The decline was fairly continuous up to the month of September, and although in October and November it was arrested to some extent, values at the middle of December 1931 were lower generally than at any corresponding period since December 1921. The index-numbers from August to December 1931, and for December 1930, are shown below.

December 1921 = 100.

	Fixed Interest Stocks.	Variable Dividend Securities.	Total.
August, 1931	107·2	98·2	104·3
September, ,, ...	103·5	89·5	99·0
October, ,, ...	104·2	100·6	103·1
November, ,, ...	104·8	99·4	103·1
December, ,, ...	102·2	90·7	98·5
—	—	—	—
December, 1930	112·5	118·5	114·4

Measured by the Ministry of Labour index-number, the general level of *retail prices* of articles of working-class consumption showed a fall of 3·9 per cent. between January 1, 1931, and January 1, 1932, and at the latter date was 47 per cent. above the level of July, 1914. Articles of food declined 5 per cent. and articles of clothing rather more than 7 per cent.

Prices of clothing continued to fall gradually during the year, but prices of food, which had dropped more or less steadily during the first nine months, rose somewhat during the last quarter. Apart from slight seasonal variations this was principally due to the high price of potatoes, the index-number for which stood at 187 at January 1, 1932, compared with 128 at January 1, 1931 (July, 1914 = 100). The percentage increases since July, 1931, are shown below.

	Aug. 1931.	Sept. 1931.	Oct. 1931.	Nov. 1931.	Dec. 1931.	Jan. 1932.
Food Prices	28	28	28	30	32	31
All Items (Food, Clothing, Rent, Fuel, etc.) ...	45	45	45	46	48	47
All Items (a year earlier) ...	*57*	*57*	*56*	*57*	*55*	*53*

The mean index number for 1931 was 47·5 per cent. above the standard (July, 1914) compared with 58 per cent. in 1930. It was lower than in any year since 1916, when the index-number showed a rise of 46 per cent. on the standard.

Since August, 1930, returns relating to *retail sales* have been prepared by the Incorporated Association of Retail Distributors in conjunction with the Bank of England. These figures, which are published monthly in the *Board of Trade Journal,* show the relation of the sales of each month to those of the corresponding months a year ago. The kinds of merchandise for which separate figures are given include food and perishables, piece-goods, women's wear, men's and boys' wear, boots and shoes, furniture, hardware, fancy goods, and sports goods, &c. The returns include those from the large departmental stores and from co-operative societies, and are sufficient in number and weight to be classified under five districts—London (Central and West End), London (Suburban), South of England, Wales and North of England, and Scotland. In the latest return for the month of December, 1931, cumulative figures are given for the period February to December, 1931, from which it appears that the total retail sales of all merchandise for the eleven months showed a decline of 4·8 per cent. on the sales of the corresponding eleven months in 1930. The sales of food and perishables showed a fall of 5·2 per cent. and those of other merchandise of 4·3 per cent. The fall was largest, 8·0 per cent., in the London (Central and West End) District, and least, 3 per cent., in Southern England. Bearing in mind the fall in retail prices which has taken place during the eleven months covered by the returns, the figures do not disclose any drop in Great Britain in the consumption of commodities.

In addition, figures are given showing each month the number of persons employed and the value of stocks held compared with the corresponding month a year ago, but these figures do not cover co-operative stores. At the end of December 1931, the value of stocks held had fallen 3·9 per cent. compared with December 1930, and the numbers employed had decreased 0·7 per cent.

The decline in the average level of wage rates in 1931 as recorded by the Ministry of Labour was greater than in any year since 1922. It was most considerable in the following trades and industries: engineering, textile (wool, flax, jute, bleaching, etc.), building, coal-mining, railways, pottery, chemicals, boot and shoe making, iron and steel manufacture and other metal trades. No general change took place in cotton, printing, bookbinding, and flour-milling industries or in marine and dock transport. In all the industries and services for which statistics * are available the changes resulted in an aggregate net decrease of nearly £405,000 in the weekly full-time rates of wages of about 3,000,000 work-people, and in a net increase of about £5,000 in those of 46,000 work-people. It is estimated that the average decrease for all industries combined was equivalent to over 2 per cent. of the wage rates in operation at the beginning of the year.

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* The statistics are exclusive of changes affecting agricultural labourers, Government employees, domestic servants, shop assistants and clerks.

The normal hours of labour of 401,000 work-people were reported to the Ministry of Labour as having been changed in 1931. Of these, 293,000 work-people experienced an average increase of about 1 hour per week and 108,000 an average decrease of about 1½ hours. Nearly 98 per cent. of the work-people affected were coal-miners, whose working hours were changed in consequence of the adoption of 7½-hour shifts under the Coal Mines Act of 1930. Underground workers in South Wales and Scotland were principally those whose hours were increased, while surface workers in Scotland and underground workers in Leicestershire, Staffordshire, Warwickshire and North Wales obtained reductions in hours. Apart from fluctuations in the hours worked by coal-miners there has been little movement in working hours since the large reductions that took place in 1919 and 1920.

The total number of work-people involved in 1931 in *trade disputes* which begun in that year was 424,600. These were directly affected, *i.e.* on strike or locked out, and in addition, about 65,000 were thrown out of work at establishments where the disputes occurred but were not themselves parties to the disputes. The aggregate time lost in 1931 owing to disputes was nearly 7,000,000 working days compared with 4,400,000 working days lost in 1930. Disputes in the cotton and coal-mining industries accounted for over 88 per cent. of the total number of working days lost in 1931, and two disputes, both beginning in January, 1931, accounted for over two-thirds of the total, viz. the coal-mining dispute in South Wales and Monmouthshire on the question of a reduction in wages of day wage men consequent on the shortening of hours, and the dispute in the cotton trade on the " more looms per weaver " question. The years in which the largest number of working days were lost owing to trade disputes were 1912, 1921 and 1926, years of general coal-mining disputes. In these years the working days lost amounted to 41 millions, 86 millions, and 162 millions respectively.

The following table gives for the principal countries the percentage increases, on July 1931, and on the latest date available, of the retail prices of food and other items compared with the prices at July 1914.

	Retail Prices of Food.		Retail Prices of All Items.		Date of Latest Return (1931).
	July, 1931.	Latest date available	July, 1931.	Latest date available.	
Great Britain ...	30	31	47	47	Jan. 1, 1932
Overseas Dominions, etc.					
Australia... ...	25	25	25 (figure	for 3rd qr.)	Nov.
Canada	10	7	37	35	Nov.
India (Bombay) ‡	0	1	8	9	Dec.
Irish Free State	43*	55	57*	65	Nov.
New Zealand ...	18	18	45	42	Nov.
South Africa ...	4	2	22	22	Nov.
Foreign Countries.					
Belgium	—	—	689	676	Nov.
Czechoslovakia ...	17	11	4	1	Oct.
Denmark ...	19	19	54	54	Oct.
Egypt (Cairo) ...	—	—	34	37	Oct.
France (Paris) ...	517	461	465 (figure	for 3rd qr.)	—
Germany... ...	30	22	37	32	Nov.
Holland (Amsterdam)	—	—	54 (June)	51	Sept.
Italy	342	345	—	—	Nov.
Norway	38	36	67	50	Nov.
Spain (Madrid) ...	93	100	5	2	Oct.
Sweden	30	29	58	58 †	Oct.
Switzerland ...	40	37	50	47	Nov.
United States ...	17	17	50 ‡	50	—

* Figure for August. † Figure for October. ‡ Native Families.

Unemployment in Great Britain and Northern Ireland was more acute in 1931 than in any previous year. The mean rate of unemployment in the insured trades, which had risen from 10·4 per cent. for 1929 to 16·1 for 1930, increased to 21·3 per cent. for 1931. Although there was a seasonal improvement in the spring months, the reduction in unemployment was slight, and during June, July, August and September the numbers out of work continued to increase, until at the end of the last-named month, the number of workpeople returned by the Ministry as unemployed was 2,896,989—the highest number ever recorded. Since that date, however, there has been a fairly steady improvement, and towards the end of the year (December 21) the number returned as out of work in Great Britain had fallen to 2,573,552, a reduction of 323,437. Some portion of this reduction was the result of the legislative changes introduced by the Unemployment Insurance (No. 3) Act, 1931, and the National Economy Act, 1931, as these had some effect in diminishing the number registering at Exchanges. It has been estimated by the Ministry of Labour that at the outside 90,000 persons (mostly married women) ceased to register at Employment Exchanges on this account, so that the drop in unemployment between the end of September and the end of the year (December 21) can be taken to be not less than 223,000. The numbers recorded as out of work at that date were, however, greater than at December 22, 1930.* The means of the monthly percentages of insured persons recorded as unemployed for each of the years 1921–31 are as under:—

1921	17·0	1925	11·3	1929	10·4
1922	14·3	1926	12·5	1930	16·1
1923	11·7	1927	9·7	1931	21·3
1924	10·3	1928	10·8		

The legislative changes referred to above had not up to the end of December affected the recorded number of insured workers unemployed, and the monthly percentages unemployed in Great Britain and Northern Ireland given below are comparable throughout the year.

Jan.	21·5	May	20·8	Sept.	22·6
Feb.	21·7	June	21·2	Oct.	21·9
March	21·5	July	22·0	Nov.	21·4
April	20·9	Aug.	22·0	Dec.	20·9

According to the official reports summarized in the *Ministry of Labour Gazette*, employment in Germany has worsened considerably since July, 1931. The number of persons reported by the Employment Exchanges *as available for and seeking work* rose but slightly during July. From July, however, the numbers increased steadily and considerably month by month, so that while the numbers recorded at the end of June was 4,082,596, the figure for the end of December stood at 5,745,726. Of these, 5,665,669 were definitely recorded as unemployed and 3,147,612 were in receipt of either the standard or emergency unemployment benefit.

Returns from German trade unions covering more than four million workpeople also show a continued increase in unemployment, the proportion unemployed having risen from 29·7 per cent. at the end of June to 38·9 per cent. at the end of November, 1931. In addition, at the latter date 21·8 per cent. of their members were on short time.

In France the number of persons on the registers of Employment Exchanges increased each month from July 1931, and at the end of December 1931, amounted to 186,540 compared with 26,514 at the end of December 1930. In recognition of the fact that these figures are not sufficiently representative, a special official investigation has taken place during each month of the year 1931 into the numbers employed and hours worked in mining, industrial, transport, and commercial undertakings employing at least 100 workers. At the beginning of January, 1931, there was a decline of 4·2 per cent. in the numbers employed compared with the corresponding period in 1930, and 14·0 per cent. of those employed were found to be on short time. In each succeeding month the proportion employed compared with a year ago had declined, until at the beginning of December 1931, 12·6 per cent. less were being employed than on the corresponding date in 1930. The number on short time had greatly increased, and at the beginning of December was 45·5 per cent. of those employed. On the basis of the January 1931 investigation it was officially estimated that the number of persons wholly unemployed in France at that date was 350,000 and those on short time 1,000,000. If the number of firms under investigation has not varied much during succeeding months it would seem that there are at least 1,000,000 out of work in France and 3,000,000 on short time.

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* The series of statistics of numbers unemployed which has been issued weekly by the Ministry of Labour for some years has now been discontinued and will be replaced by a monthly revised and corrected figure. The first of these revised statements will appear about the middle of February, 1932.

For Belgium the number of unemployed members of Approved Unemployment Societies did not vary greatly during the ten months ending in October, 1931, the latest date for which figures are available, except for a slight seasonal improvement in the spring months, but the rate of unemployment was much higher than in 1930. Taking the twelve months November 1930–October 1931, the mean rate of unemployment was 9·8 per cent. compared with 2·6 per cent. in the period November 1929–October 1930. At the end of October, 1931, 11·3 per cent. of the members were unemployed, and in addition 16·8 per cent. were employed intermittently during the month, the time lost by them amounting to 15 per cent. of the aggregate possible working days.

In Sweden and Denmark employed also declined considerably during the year, the mean rate furnished by the trade unions for the last recorded twelve months being 16·3 per cent. in Sweden and 18·0 per cent. in Denmark compared with 11·2 per cent. and 13·9 per cent. respectively in the preceding period.

Employment in Italy was much worse in 1931 than in the previous year. The numbers recorded as unemployed by the National Social Insurance Fund was at least 50 per cent. greater in each month than in the corresponding month of 1930, and at the end of November amounted to 878,267 as compared with 534,356 at the end of November, 1930.

Employment in the United States, according to returns received by the Federal Bureau of Labour Statistics, continued to decline from May until November, 1931, the date of the latest return, both the numbers employed and the wages earned by firms employing about four and a half million work-people in various branches of industry and commerce showing a decline as compared with each previous month. Roughly the decline in employment over the period amounts to about 10 per cent., and in the amount of wages paid to about 17 per cent. The Bureau's index-number of employment (in manufacturing industries only) continued to fall over the same period. At the end of April, 1931, it was 74·5 (average of employment in 1926 = 100), and at the end of November, 1931, it was 65·4, a fall of over 12 per cent. Taking the period December to November in each of the last three years, the mean annual index numbers were 97·8 for the twelve months ended November, 1929, 85·1 for the twelve months ended November, 1930, and 71·7 for the twelve months ended November, 1931.

The index-number of employment in Canada prepared by the Dominion Bureau of Statistics on the basis of returns received from firms employing over 900,000 work-people shows that employment declined considerably in 1931 compared with both 1930 and 1929. If average employment of the reporting firms in 1926 be taken as 100, the index-number for 1931 is 102·5, for 1930, 113·4, and for 1929, 119·0, or a decline in employment of nearly 19 per cent. as between 1929 and 1931, and of nearly 10 per cent. between 1930 and 1931.

The Macmillan Company of Canada have published two volumes of *Statistical Contributions to Canadian Economic History.* Dr. W. A. Mackintosh, Professor of Economics at Queen's University, Kingston, contributes a very brief introduction, and Dr. Curtis, Associate Professor of Economics at the same University, deals with Banking Statistics. Mr. K. W. Taylor, the Associate Professor, and Mr. H. Michell, the Professor of Political Economy at McMaster University, deal respectively with Statistics of Foreign Trade and Statistics of Prices. The banking statistics cover the period 1867–1929, but many of the tables give data only for two, three, four, or six-yearly intervals, while some special banking statistics for Ontario and Quebec go back to 1856. The trade tables cover the years 1869–1915 and are continuous in considerable detail; the corresponding particulars for the war and post-war years have been omitted on account of "a number of complicating factors." The price tables relate to 70 commodities, for which index-numbers in 13 groups are given for 1868–1925; aggregate monthly index-numbers for 35 commodities are given for 1868–1918; monthly prices of each of 20 agricultural commodities in Toronto are given for 1848–67; and monthly prices of each of the 70 commodities are given from 1868 to 1889. Professor Burton Hurd and Mr. T. Brooks of Brandon College also contribute "a study of individual wholesale price movements, 1868–1913." Professor Mackintosh observes that the object of the compilations has been, not to exhaust the analysis, but "to present in intelligible and usable form records which are not available in any single library, or which cannot be used until they have been put in comparable and convenient forms." With reference to the "phenomenally rapid growth of Canadian business after 1900," he suggests that "insufficient attention has probably been given to the effect of a steeply upward secular trend of business activity in stimulating early recovery from periods of depression." Modern uses of statistics require that such information should be published not only fully but promptly, and it is sad to see that Professor Curtis, while maintaining that his collection of statistics is "very useful and valuable," has to regret that owing to the late issue of the bank return "the statistics contained in it are quite worthless from the view-point of forecasting business conditions, or even of interpreting them." The trade statistics are fairly familiar, but a useful table of import and export values on the 1900 basis has been added. The price tables will be found to contain much novel information.

The Europe–United States Committee of the International Chamber of Commerce has published a series of studies under the general title *Europe–United States*, "relating to the most characteristic features of the economic structure of the two areas and to their commercial and financial relations." The first is an introductory address by Signor Alberto Pirelli, chairman of the committee, surveying the main features of the subsequent parts, and concluding that recovery of world trade "cannot be secured by the action of any single nation or continent," but "will be rapid and effective in the degree in which the free play of international economic forces is once more left free to secure a more stable equilibrium between the available supplies of goods, capital, and men." The six other parts treat respectively of "Development of Trade and Capital, their distribution and competitive conditions between the two areas since 1900; Comparison of the characteristic aspects of production in Europe and the United States of America; Economic relations between Europe and the United States of America in the field of agriculture; Trends in the organization and methods of Distribution in the two areas; Economic Crises, Unemployment; Psychological elements. Eleven separate memoranda are included in the series.

Senator de Michelis, President of the International Institute of Agriculture, writes on agriculture, Professor Siegfried on psychological elements; and among other contributors are Mr. Henry Clay, Mr. L. Urwick, and Professor Wagemann. Each report consists of one or more memoranda fortified by a more or less great apparatus of statistics. The statistical tables in Part 2 are numerous and give a good conspectus of the commercial relations between Europe and the United States and of the competition of the two areas in various markets; the note in this Part on capital movements is necessarily brief and scrappy. Part 3, on cost of production, unavoidably suffers from the imperfection of the data. Part 5 will introduce the reader to much new material on the problems of distribution, and Part 6, which is much à propos of current questions, contains an essay by Professor Wagemann on "Resistance of various Economic Structures to Crises," another by Mr. Hans Vogel on "Economic Aspects of Unemployment," and a report on "Employment Regularization in the United States of America" by a special American sub-committee.

Materials useful in the investigation of world trade problems are also to be found in the publications of the League of Nations. *Selected Documents on the Distribution of Gold submitted to the Gold Delegation of the Financial Committee* has already received considerable public notice. Professor Aftalion, Professor Bruins, Professor Gregory, and Mr. George E. Roberts write, respectively, on the movements of gold into and out of France, Germany, Great Britain, and the United States, and two tables summarize the movements of gold stocks and of imports and exports of gold. The League has also recently published (price 6*s*.), under the title *The Course and Phases of the World Economic Depression*, a report prepared by Professor Ohlin of Stockholm with the assistance of the staff of the Economic and Financial Organization of the League. The phases of the present depression are recounted and the interaction of the various factors in economic life are analysed. It will be advantageous to study this volume side by side with the Macmillan Report. The *Memorandum on Production and Trade 1925 to 1929–30*, published by the Economic Intelligence Service of the League, is indispensable. Other useful collections of statistics are *Deutsches Wirtschaftskunde*, a summary of German industrial statistics with explanatory text prepared by the Statistisches Reichsamt; *The Economic Forces of the World* (third issue), a review of trade and production statistics published by the Dresdner Bank; and *La Vita Economica Italiana*, which does for Italy what the service of the Harvard Economic Society does for the United

States. South America is so important in British trade that attention may also be drawn to *Indexes of Business Conditions* (*Brazil*) by F. de Souza Reis. It opens with a table of food prices in Rio de Janeiro, 1910–30, and an analysis of the trends. Tables and graphs of purchasing power parities follow, and then tables of production of natural products; coffee prices; banking and currency statistics (forming the bulk of the oblong quarto); import and export statistics in summary form; security statistics; and income tax. Graphs are used throughout to show seasonal variations, cyclical movements, and secular trends, where such analysis is applicable.

Following on the abortive Imperial Conference, Messrs. Erlangers, Ltd., the bankers, have started the publication of a series of reports on *The Manufacturing Industries of the British Empire Overseas*, in order " to place before our readers information as to the manufacturing industries now developed in the British Empire overseas." In an introductory note the various proposals for fostering intra-imperial trade are mentioned, but not discussed as the object of publication is not political, and "in all cases our manufacturers will require to study the needs of each market and produce goods at competitive prices." The first three numbers in the series have been issued, Canada, Australia, and the Union of South Africa, and the first two have gone through two editions. The information has been obtained from official sources and set out in handy tables with appropriate comment. There are also a number of graphs in "plate " form and highly coloured, which are certainly decorative and will be useful to those who cannot absorb tables of figures. There is a good deal of ignorance in this country as to the progress of manufacturing industry in the Dominions, and official publications are not always readily accessible to everyone. Messrs. Erlangers, therefore, are to be commended for their enterprise.

It is scarcely necessary to do more than mention the issue of the *Review of the Trade of India in 1930–31* by the Department of Commercial Intelligence and Statistics, India. The series of such reports, of which this is the fifty-seventh, has long established itself as indispensable to students of economic conditions in India. The Report, by Mr. Meek, Director-General of Commercial Intelligence and Statistics, covers 152 pages and is followed by 109 pages of tables. There are also nine charts, seven dealing with trade, one with gold, silver, and exchange, and one in 16 pages giving weekly prices in 1930–31 of 46 commodities. Some of the tables showing variations in shares of trade are at first sight somewhat difficult to read. Mr. Meek summarizes the causes of the world depression, which also affected India, as being :—over-production, especially of primary commodities; concentration of gold in France and the United States; political unrest, notably in India, China, and South America. Between September 1929, and January 1931, wholesale prices at Calcutta fell by 32 per cent., and, though there was a slight rise in the two following months, the fall in July 1931 reached 35 per cent. The prices of 28 articles exported from India fell by 39 per cent. from September 1929, to March 1931, and the prices of 11 articles imported into India fell in the same period by 14 per cent. The explanation of this difference is that the exports were mainly agricultural raw materials and the imports mainly manufactured goods. The index-numbers of prices in Calcutta showed falls of 50 per cent. in raw jute, 49 per cent. in oil-seeds, 47 per cent. in wheat, 36 per cent. in raw cotton, and 35 per cent. in rice between September 1929, and March 1931. Imports of private merchandise into India were more than 32 per cent. less in 1930–31 than in the previous year, and "it cannot be denied that a great proportion of the fall in the value of imports was due to the fact that the Indian consumer has been unable to buy the imported commodities because of his depleted purchasing power." Nearly 43 per cent. of the imports came from the United Kingdom in 1929–30 and only a little more than 37 per cent. in 1930–31. " The boycott was responsible for some reduction in imports, the chief examples being cotton piece-goods and tobacco . . . it affected imports from the United Kingdom more severely than it did the total volume of imports." One other important comparison may be permitted; in 1913–14 97·1 per cent. of the total quantity of cotton piece-goods imported into India came from the United Kingdon and only 0·3 per cent. from Japan, but in 1930–1 the British share had sunk to 58·8 per cent., and the Japanese had risen to 36·1 per cent.

The Economic Committee of the League of Nations has issued the first volume of a Report on the international aspects of the agricultural crisis, based on views of experts consulted by the Economic Committee in 1930–31. The crisis is considered to be universal, though operating with very unequal intensity in different countries; it is characterized by lowness of prices combined with an inability to adjust costs of production to a corresponding degree, so that there is a disproportion between the prices of commodities and services for which the farmer has to pay and the prices of the products which he is able to sell. This condition of affairs is held to be due to a disturbance of the balance between production (which is in excess) and consumption (which is short). But whereas experts are more or less agreed as to the causes of the crisis, they differ profoundly as to the means of combating it. The Report discusses various possible remedies under such heads as (1) free trade and protection, (2) preferential customs treatment, (3) increase of consumption, (4) curtailment of production, (5) organization of markets, (6) the spread between the prices obtained by producers and the prices paid by consumers, and (7) international agricultural credit. Attached to the Report are monographs describing the position of agriculture in the different countries, the monograph on Great Britain being by Mr. R. R. Enfield.

The Second International Conference of Agricultural Economists, held at Cornell University, U.S.A., August 18–29, 1930, was the successor to an initial meeting held in England in 1929. The Report of its Proceedings contains 83 papers contributed by writers in sixteen countries—in itself a striking testimony to the advance which is being made in studying the economic problems of agriculture. The subjects of the Conference covered an extensive field, including marketing, prices and farm management, as well as the special problems of particular countries, such as Russia, and ranged from statements of work in progress to discussions of principles and policy. Readers will find in this volume a valuable indication of the work which is being done in agricultural economic research in many parts of the world.

As the Conference was held in the United States, it naturally had the advantage of hearing a wide selection of contributions from the American point of view, which, characteristically practical, aims at making agricultural economics an " applied science " by seeking solutions to current problems. " Society," said Dean Mann in his opening address, " needs as an instrument of progress a scientific approach to the economics of agriculture, and governments everywhere, as they venture into new areas of trial and experience in the application of economic theories in relation to agriculture, are deplorably in need of what a science of agricultural economics should become competent to supply." The very high standard of the papers presented to this Conference shows, at least, that an approach is being made to this ideal, and that economic workers are seeking for facts and knowledge which will help governments and farmers to a better understanding of the obscure problems which lie in the way of agricultural betterment.

The depression in agriculture naturally occupied a prominent position on the programme, and provided an opportunity for various authorities to express their more or less divergent views: agreement is hardly to be expected where differences depend largely on the angle from which the problem is approached. Professor Max Sering found the predominant, though not necessarily the only cause of agricultural depression in over-production and under-demand, that is, in the results of great technical progress and favourable harvests combined with a lowering of the purchasing power of industrial Europe; Mr. E. M. H. Lloyd and Mr. R. R. Enfield expounded the opposite point of view which sees the fundamental cause of world-wide depression in monetary factors and the maldistribution of gold; Dr. G. F. Warren of Cornell University took a midway position by attributing the depression only partially to over-production and mainly to a lack of adjustment in the price structure which leaves the prices obtained by farmers low in relation to wages, retail prices and the cost of living; while Dr. Ezekiel, who is Economic Adviser to the Federal Farm Board, proceeding on the view generally held in America, that depression is the result of a lack of balance between supply and demand, discussed, in a paper dealing with the "Problem of agricultural surpluses in the United States," the possibility of preventing their occurrence or alternatively of ameliorating their effects. These and other papers on allied questions provide an interesting compendium of the opinions held in different countries on many phases of agricultural policy.

Two small brochures which have reached this Society contain the proceedings of the "Wiener Statistische Sprechabende," an association formed for the study and furtherance of statistical science about two years ago. The first meeting was inaugurated by an address from Dr. Walter Breisky, the then President of the Austrian Statistical Office. Afterwards Dr. William Winkler, in a paper entitled "Die Statistik in Oesterreich," sketched the history of Austrian State statistics, which began in 1829 with the preparation of a hundred lithographed copies of von Metzburg's "Statistical Tables of the Austrian Monarchy" for departmental use, culminated in the establishment of the "Statistical Central Commission" in 1863, and since 1870 has shown a gradual deterioration owing to the decentralization of the departmental statistics, the elimination of statistics as a compulsory subject in the University examinations, and, finally, to the financial stringency of the post-war period. Nevertheless, as Dr. Palla, at the second meeting, pointed out (in a paper on "Problems of Social Statistics"), a number of organizations in Austria are producing statistics in addition to those compiled by the Central Office; notably the Statistical Bureau of the Chamber of Labour, the Konjunkturforschungsinstitut, and the Institute for Social Insurance.

The third paper, by Dr. Rudolf Riemer, of the Bundesamt für Statistik, discusses the proper basis and methods for the Austrian Industrial Census of 1930.

On December 2nd, 3rd and 4th, 1931, Professor Major Greenwood, F.R.S., delivered the twentieth course of lectures on the Herter Foundation in Johns Hopkins University, Baltimore. According to the terms of the gift, "some eminent worker in Physiology or Pathology is to be asked each year to deliver a lecture at the Johns Hopkins University upon a subject with which he has been identified." Recent English holders of the lectureship include Sir Henry Dale, F.R.S., Sir Frederick Hopkins, P.R.S., Sir Arthur Keith, F.R.S., the late Sir William Bayliss, F.R.S., and Professor A. V. Hill, F.R.S. This is the first occasion on which a medical statistician has been selected. Professor Greenwood lectured on "The Application of the Experimental Method to the Study of Epidemiology," dealing mainly with the statistical aspects of the subject.

The Study Group held its first meeting this Session in October, when the Chairman, Mr. A. P. L. Gordon, spoke on "The Function of Statistics in Relation to Investments." In November Mr. P. W. Stephen read a paper on "The Board of Trade Wholesale Index-Number in Retrospect." A very useful discussion followed. The capacity of the Society's premises was over-taxed in December, when a joint meeting with the Institute of Actuaries Students' Society was held under the Chairmanship of Sir Josiah Stamp. Mr. W. S. Hocking, M.B.E., read a paper on The Recent Census to an audience of about 110, and Miss Iris Douglas opened the discussion, in which the Registrar-General participated. Mr. A. W. Flux and Dr. E. C. Snow were also present. The members have expressed their appreciation of the facilities given by the Council of the parent Society, which so largely contributed to the success of the meeting.

All fellows of the R.S.S. are invited to attend the Group meetings held every second Tuesday of the month; notice of the subject to be discussed will be sent on request.

The Council of the Royal Statistical Society again offers the Frances Wood Memorial Prize, value £30, for competition in 1932. As in former years, the Prize is offered for the best investigation, on statistical lines, of any problem affecting the economic or social conditions of the wage-earning classes. Competitors will choose their own subjects, but it is believed that original observation or analysis made in the course of the writer's ordinary work or special research will afford useful material for papers. Further particulars may be obtained on application to the Assistant Secretary of the Society, at 9 Adelphi Terrace, W.C.2.

STATISTICAL AND ECONOMIC ARTICLES IN RECENT PERIODICALS.

UNITED KINGDOM—

Accountants' Magazine—

December, 1931—Is the case for free trade still valid? *A. Birnie.*

January, 1932—Amalgamations: *A. E. Cutforth.*

Agricultural Research in 1930, 1931—Agricultural economics: *C. S. Orwin.* Animal nutrition: *C. Crowther.* Soils and fertilizers: *Sir E. J. Russell.*

Auctioneers' and Estate Agents' Institute of the United Kingdom, Journal—

November, 1931—Developments of London building sites: *H. E. Senior*

January, 1932—Agricultural finance as revealed in stocktaking valuations: *Leslie S. Wood* (with discussion). Present-day rating and valuation: *F. T. Hart* (with discussion).

Bankers' Magazine—

October, 1931—Progress of banking in Great Britain and Ireland during 1930. The menace of the national debt.

November, 1931—An artificial crisis: *Gustav Cassel.* The United Kingdom gold crisis of 1931 (with charts): *A. J. Liversedge.* The way of prices: *E. G. Peake.*

December, 1931—The "pound" at sea: *Frank Morris.* The financial outlook: *Beaumont Pease.* Public economy: *Sir Ernest Benn.* A banker on the gold standard (*Brig.-Gen. Sir A. Maxwell*).

Biometrika, November, 1931—Some properties of "Student's" z: correlation, regression and scedasticity of z with the mean and standard deviation of the sample: *Karl Pearson.* The analysis of variance in cases of non-normal variation: *Egon S. Pearson.* A study of the distribution of the variance in small samples: *J. M. Le Roux.*

Chartered Surveyors' Institution, Journal—

November, 1931—Possible effect on property values of the departure from the gold standard: *J. G. Head.*

December, 1931—The opening address. By the President: *J. E. Bidwell.* "The Wheat Quota": *E. A. Ruggles-Brise.*

January, 1932—Discussion of Colonel Ruggles-Brise's paper.

Economica—

August, 1931—Reflections on the pure theory of money by Mr. J. M. Keynes: *F. A. von Hayek.*

UNITED KINGDOM—*Contd.*

Economic Journal—

September, 1931—Statistical studies of the present economic position of Great Britain: *C. G. Clark.* British foreign investments in 1929: *Sir Robert Kindersley.* Silver: a study in monetary instability: *J. H. Kirk.* Mr. Keynes' theory of money: *D. H. Robertson.* A rejoinder: *J. M. Keynes.* The report of the Macmillan Committee: *Sir Josiah Stamp.*

December, 1931—The changed outlook in regard to population, 1831–1931: *E. Cannan.* Readjustment in Australia: *D. B. Copland.* The world's wheat situation: *R. R. Enfield.* The law of decreasing costs: *R. Harrod.* The results of the 1928 new issue boom. Unrecorded unemployment in the cotton industry: *J. Jewkes* and *A. Winterbottom.* Interest and usury in a new light: *H. Somerville.*

Economic History, January, 1932—The assize of bread in London during the sixteenth century: *Frieda Nicholas.* The Bank of England and the South Sea Company: *R. D. Richards.* The first five thousand limited companies and their duration: *H. A. Shannon.* The beginnings of the world crisis, 1873–96: *J. T. W. Newbold.* Wages policy in Soviet Russia: *S. L. Childs* and *A. A. Crottet.*

Faculty of Actuaries, Transactions—

No. 123, 1931—Occupation and climatic rates of mortality: *I. A. M'Taggart.*

No. 124, 1931—Aviation risks in relation to life assurance: *C. F. B. Richardson.*

Institute of Actuaries, Journal, Part I, 1931—The analysis of a sickness experience: *Sir Alfred Watson.* Valuations in modern conditions: *W. Palin Elderton.* Notes on the life table and the limit of life: *J. F. Steffensen.*

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November, 1931—Exchange dealings under current conditions: *H. E. Evitt.* The "Macmillan Report": *W. J. Hinton.*

December, 1931—Inaugural address of the President (Brig.-Gen. *Sir A. Maxwell*). Some aspects of the world depression: *Henry Clay.*

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Lloyds Bank Limited, Monthly Review—

December, 1931—The balance of trade.

January, 1932—Franco-German economic relations: *Sir William Dampier.* Labour and the balance of trade: *Rt. Hon. William Graham.*

Ministry of Agriculture, Journal, November, 1931—The solution of a breeding problem: *Thomas Scott.* A remarkable small-holding in South Wales: *A. W. Ashby* and *S. T. Morris.* Notes on prices and supplies: *R. J. Thompson.*

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Public Administration, Journal—

October, 1931—The story of London transport: *Sir Robert Donald.* Research in public administration: *Luther Gulick.* Local Government in Germany: welfare and public health: *M. L. Dhonau.*

January, 1932—Economy in purchase and in use: papers by *Sir Henry Bunbury* and *F. Steadman.*

Royal Meteorological Society, Quarterly Journal, January, 1932—Some problems of modern meteorology, 6: The present position of seasonal weather forecasting: *C. W. B. Normand.*

Royal Institution of Great Britain, Proceedings, Part IV, 1931—The measurement of noise: *G. W. C. Kaye.* The future of the human race: *The Very Rev. W. R. Inge.*

Royal Philosophical Society of Glasgow, Proceedings, Vol. LIX, 1930–31—Presidential address: The trade and industry of Glasgow: *George A. Mitchell.*

Statistical and Social Inquiry Society of Ireland, Journal, October, 1931—An analysis of the national finance of the Irish Free State: *J. C. M. Eason.* The currency system of the Irish Free State: *J. Brennan.*

Westminster Bank Review, December, 1931—The past year.

INDIA—

Indian Journal of Economics, October, 1931—Optimum taxability: *D. Ghosh.* A study of some vital problems relating to the working-class population of Bombay: *G. S. Ghurye* and *S. R. Deshpande.*

AUSTRALIA—

Economic Record, November, 1931—Financial reconstruction. An examination of the plan adopted at the premiers' conference, 1931: *F. A. Bland.* Australian monetary policy reviewed: *Roland Wilson.* Public finance and depression in New Zealand: *A. H. Tocker.* The doctrine of rationalization: *F. R. E. Mauldon.*

UNITED STATES—

American Academy of Political and Social Science, Annals—

September, 1931—Prisons of to-morrow. Part I. The American prison. Part II. Prisons abroad.

November, 1931—An economic survey of Australia. 1. Population and economic resources. 2. Trends in production and trade. 3. Industrial organization and economic control. 4. Labour and industrial relations. 5. Public finance and state enterprise. 6. Politics and industry—stocktaking.

UNITED STATES—*Contd.*

American Economic Review—

September, 1931—American plans for state unemployment insurance: *Carter Goodrich.* Agricultural theory of business cycles: *M. D. Anderson.* International control of raw sugar: *Clifford L. James.*

December, 1931—Wage levels between firms: *H. La Rue Frain.* Profits and size of firm in the automobile industry: *R. C. Epstein.* Stock dividends and New York Stock Exchange: *H. C. Freeman.* Advertising and economic theory: a criticism: *A. Victor Abramson.* Seasonal unemployment insurance: a comment: *J. Murray Carroll.* State unemployment insurance: a comment: *Burnham P. Beckwith.*

American Philosophical Society, Proceedings, No. 4, 1931—Individual versus mass studies in child growth: *C. B. Davenport.*

American Statistical Association, Journal—

September, 1931—Statistical method from an engineering viewpoint: *W. A. Shewhart.* Enumeration and sampling in the field of the census: *R. H. Coats.* Can we find out how the American income is spent? *Louis Bader.* Statistical measures of social aspects of unemployment: *Meredith B. Givens.* Tabulation of family data from the 1930 census: *L. E. Truesdell.*

December, 1931—Statistical correlation and the theory of cluster types: *Ragnar Frisch* and *Bruce D. Mudgett.* The accuracy of official tuberculosis death-rates: *Jean Downes.* Frequency distributions corresponding to time series: *Dickson H. Leavens.* Pre-census population records of Spain: *P. Granville Edge.* The analysis of covariance: *A. L. Bailey.* The index of the volume of trade: third revision: *Carl Snyder* and *Leroy M. Piser.* Goodness of fit: *E. B. Wilson, M. M. Hilferty* and *H. C. Maher.*

Harvard Business Review, October, 1931—Deflating indemnity hopes and war debts: *J. Franklin Eversole.* Trends in large-scale retailing: *Malcolm P. McNair.* Free and fixed prices during the depression: *O. Morgenstern.* The geographical approach to the study of some business problems: *L. Dudley Stamp.* Distribution problems of the oil industry, II: *Sidney A. Swensrud.*

Journal of Political Economy—

August, 1931—The fall in the value of silver and its consequences: *Frank D. Graham.* The Stevenson plan: some conclusions and observations: *Charles R. Whittlesey.* Organized labor and the family-allowance system in France: *M. R. Clark.*

October, 1931—Léon Walras and the "cash-balance approach" to the problem of the value of money: *Arthur W. Marget.* The interrelation between capital production and consumer-taking: *Ragnar Frisch.* A further note on average elasticity of demand: *A. J. Nichol.*

UNITED STATES—*Contd.*

Monthly Labor Review—

August, 1931—Effects of technological changes upon employment in the amusement industry.

September, 1931—Extent of five-day week in American industry. Wages and hours in the motor-vehicle industry.

October, 1931—Mechanization of agriculture as a factor in labour displacement. Employment conditions and unemployment relief.

November, 1931—Accident experience in iron and steel industry to end of 1930. European housing policies since the war.

December, 1931—Unemployment insurance and benefit plans.

Quarterly Journal of Economics—

August, 1931—The monetary doctrines of J. M. Keynes: *J. H. Williams.* Rayon and the tariff: the nurture of an industrial prodigy: *F. W. Taussig* and *H. D. White.* Some economic implications of unemployment insurance: *Dale Yoder.* Saint-Simonism and the rationalization of industry: *E. S. Mason.*

November, 1931—Economic aspects of adulteration and imitation: *Carl L. Alsberg.* Velocity concepts and prices: *R. H. Lounsbury.* The separation of ownership and control in American industry: *Gardiner Means.* Wants and activities in Marshall: *Talcott Parsons.* The copper industry and the tariff: *R. B. Pettengill.*

Review of Economic Statistics, *November*, 1931—Foreign trade and the business cycle: *C. J. Bullock* and *H. L. Micoleau.*

Wheat Studies of the Food Research Institute, Stanford University—

August, 1931—The international wheat conferences during 1930–31.

November, 1931—Cycles in wheat prices.

December, 1931—World wheat situation, 1930–31.

ARGENTINA—

Revista de Ciencias Económicas—

September, 1931—Politica agraria argentina: *M. A. Carcano.*

October, 1931—La remolacha azucarera: *A. C. Serres.*

November, 1931—Evolución del crédito a través de la situación de Alemania: *E. Wagemann.* La influencia de la depreciacion monetaria en el balance de pagos del pais: *A. Eduardo Sanguinetti.*

BELGIUM—

Bulletin de l'Institut des Sciences Économiques—

August, 1931—Une comparaison de la conjoncture économique générale de la Belgique de 1897 à 1913, avec celle de la Grande-Bretagne, des États-Unis, de l'Allemagne, de la France et des Pays-Bas: *Léon H. Dupriez* and others.

November, 1931—Un indice de la production industrielle en Belgique: *François Cracco.* Les nouvelles idées de Mr. J. M. Keynes dans son " Traité sur la Monnaie ": *Charles Roger.*

DENMARK—

Nationaløkonomisk Tidsskrift—
Hefte 4, 1931—Arbejdsløshedens Paradoks: *Harald Westergaard.*
Hefte 5, 1931—Den internationale Kreditkrise og guldfoden: *Axel Nielson.* Den engelske Krise, Efteraaret 1931: *Niels Lindberg.* Erstatningsbetalingerne og den tyske Krise: *Einar Cohn.*

FRANCE—

Bulletin de Statistique et de Législation Comparée, August, 1931—La caisse d'amortissement pendant l'année 1930.
Bulletin de la Statistique Générale de la France, July–September, 1931—Les charges fiscales en France et en divers pays: *L. Dugé Bernonville* and *G. Chevry.*
Journal des Économistes—
October, 1931—L'Allemagne, l'Angleterre et le monde: *Édouard Payen.* La Chine économique: *R. J. Pierre.* La crise financière: *Henry Lepeytre.*
November, 1931—Pour éviter la vanité des récents efforts internationaux: *Édouard Payen.* La Grande-Bretagne: *R. J. Pierre.* Quelques considérations sur la crise mondiale: *P. Worms de Romilly.*
December, 1931—Les périls actuels: *Édouard Payen.* Les États-Unis de l'Amérique du Nord: *R. J. Pierre.*
Journal de la Société de Statistique de Paris—
July–October, 1931—Une théorie dynamique de la production, et son illustration par l'étude de l'activité industrielle dans la region parisienne (1927–31): *Pierre Jeramec.* L'arithmique ou étude scientifique de l'aspect quantitatif de la population: *Geza Schutz.*
November, 1931—Remarques sur la durée que l'on doit attribuer à une génération: *Marcel Jacob.* Chronique de démographie: *H. Bunle.* La prévision du prix du coton américain Roger Baury: *A. Barriol.* Le recensement de la population en Hongrie: *Emile Horn.* La dépopulation des campagnes et les moyens de communications: *Emile Borel.*
December, 1931—Le Maroc économique: *H. Bunle.* La XXe session de l'Institut International de Statistique: *Michel Huber.*
Revue d'Économie Politique, September–October, 1931—Essai sur le mouvement protectionniste en Grande-Bretagne: *Jean Weiller.* La vie économique en Russie: *Boris Eliacheff.* The Econometric Society: *Jacques Moret.* Le Congrès International pour les Études sur la Population: *William Oualid.* Les questions économiques à la XXe session de l'Institut International de Statistique: *Michel Huber.* Éphéméride de la crise financière: *J. S. Germes.*

GERMANY—

Allgemeines Statistisches Archiv—

Heft 3, 1931—Dynamik statistischer Zahlen: *Sigmund Schott.* Gesundheitsbarometer: *E. Roesle.* Beitrag zur Logik der statistischen Mittelwerte: *Paul Flaskämper.*

Heft 4, 1931—Der statistische Vergleich: *Franz Zizek.* Das Mass der relativen Variabilität: *M. S. Donnine* and *N. N. Galitsch.* Tagung des Internationalen Statistischen Instituts in Madrid 1931: *Friedrich Zahn.*

Blätter für Versicherungs-Mathematik und Verwandte Gebiete—

October, 1931—Ladislaus von Bortkiewicz: *Karl Freudenberg.* Die Prämienreserven und die Veränderungen der Sterblichkeit in der Zeit: *Filadelfo Insolera.*

January, 1932—Mathematik des Bausparens: *Rudolf Schonweise.* Annäherungsverfahren in der Lebensversicherungstechnik: *K. W. Sachs.*

Deutsches Statistisches Zentralblatt, *July–August*, 1931—Zur Methode der Rangkorrelation nach Tönnies: *Heinrich Striefler.*

Vierteljahrshefte zur Konjunkturforschung—

Hefte 2, *Teil A*—Die Weltkonjunktur Anfang September 1931.

—— *Teil B*—Die Konjunktur einzelner Wirtschaftszweige.

Hefte 3, *Teil B*—Wirtschaftszahlen des In- und Auslands.

Sonderheft 24, 1931—Die Welttextilkrise.

Weltwirtschaftliches Archiv—

October, 1931—Die Arbeitslosigkeit und das Gesetz der zeitlichen Einkommenfolge: *Otto von Zwiedineck-Südenhorst.* Rationalisierung und Arbeitslosigkeit: *Hero Moeller.* Praktische Konjunkturpolitik: *Wilhelm Röpke.* Löhne, Arbeitslosigkeit und Zölle: *Thomas Balogh.* Die Preisbewegung der Jahre 1901–1912 und 1925–1930: *Wladimir Woytinsky.* Zur Problematik internationaler Reallohnvergleiche: *Wilhelm Britelmayr.*

January, 1932—Von den Wandlungen der Weltwirtschaft in der Nachkriegszeit: *Edgar Salin.* Quantitive economics: *Johan Åkerman.* Studien über die Elastizität des Angebots: *Wassily Leontief.* Die Wirtschaft der Vereinigten Staaten von Amerika und die Weltwirtschaftskrisis: *Hermann Levy.* Die Nachfrage nach ägyptischer Baumwolle und ihre Elastizität: *Umberto Ricci.*

Zeitschrift für die gesamte Versicherungs-Wissenschaft—

October, 1931—Umbau der deutschen Sozialversicherung: *Lutz Richter.* Drei Grundprobleme des Versicherungsrechts: *Albert Ehrensweig.* Schiffsklassen und Seeversicherung: *Richard Skalweit.* Die Krisis der britischen Arbeitslosenversicherung: *Friedrich Heyer.*

January, 1932—Ein halbes Jahrhundert deutsche Sozialversicherung: *Alfred Manes.* Die Pflichtprüfung der Versicherungsbetriebe: *Max Gurtler.*

HUNGARY—

Journal de la Société Hongroise de Statistique, Nos. 2–3, 1931—Des causes de la crise économique mondiale : *Farkas Heller.* Les enseignements de la statistique de la tuberculosis des années de la guerre : *Baron Alexandre Korányi.* Sur les divergences entre les correctes méthodes de la recherche des causes en statistique et les tendánces de la statistique mathématique, avec des exemples démographiques : *Theodore Szél.*

ITALY—

Annali di Economia, Nos. 1–2, 1931—Le vicende del marco tedesco : *C. Bresciano-Turroni.*

Le Assicurazioni Sociali—

No. 4, 1931—Il problema sociale dell'abitazione: *A. di Crollalanza.* La reforma dell' assicurazione contro gli infortuni sul lavoro : *Roberto Roberti.* Occupazioni e possibilità di lavoro per le donne negli Stati Uniti : *Mary V. Robinson.* Le cause di invalidità nei marittimi della marina mercantile : *Emilia Sorrentini.*

—— *Supplement.*—L'assicurazione contro la disoccupazione in Italia nel mese di Aprile 1931–IX.

No. 5, 1931—I fattori della produzione e la disoccupazione operaia : *Bruno Biagi.* Il regime francese di assicurazioni sociali per gli operai e impiegati delle miniere e delle cave di ardesia : *G. Lange.*

La Riforma Sociale—

July–August, 1931—L'industria italiana delle automobili. Il mercato interno e la necessità dell' esportazione: *Edoardo Giretti.* La convenienza del calcolo di un numero indice del potere d'acquisto dell' oro nel mercato mondiale : *Riccardo Bachi.*

September–October, 1931—Su l'incidenza dell' interesse del capitale : *Rodolfo Benini.*

Giornale dell' Istituto Italiano degli Attuari, October, 1931—Su di una variabile casuale connessa con un notevole tipo di partizioni di un numero intero : *Francesco Tricomi.* Sul problema dell' interpolazione nella matematica attuariale : *Ugo Broggi.* Problemi sulle rendite vitalizie e loro risoluzione: *Enrico Lenzi.*

Giornale degli Economisti e Rivista di Statistica—

September, 1931—La funzione dei prezzi e l'economia " regolata " : *J. G. Kretschmann.* Per una piu ampia visione della " economia finanziaria " : *Giovanni Carano-Donvito.*

November, 1931—Considerazioni ai margini della capacità " contributiva " : *Mario Pugliese.*

Rivista Italiana di Statistica, April–September, 1931—Il barometro internationale degli affari nel 1° semestre 1931 : *Felice Vinci.* Prime riflessioni sul censimento : *Felice Vinci.*

JAPAN—

Kyoto University Economic Review, July, 1931—The rationalization of the protective tariff: *M. Kambe.* The economic development of Japan: *E. Honjo.*

RUSSIA—

Agrar Probleme, Hefte 3–4, 1931—Zur Theorie der Agrarkrisen: *G. S. Gordejew.* Ueber das Wesen der Agrarkrise: *A. Bondarenko.* Die Getreideausfuhr der Sowjetunion und ihre Perspektiven: *K. Rubinstein.* Die Agrarkrise in den Vereinigten Staaten von Nordamerika: *J. Sossienski.* Der Plan der sozialistischen Rekonstruktion der Landwirtschaft für 1931: *M. Wolf.* Das Problem der Elektrifizierung der Landwirtschaft der Sowjetunion (Zur Ausarbeitung des Generalplans): *L. Dubinski.*

SWEDEN—

Ekonomisk Tidskrift, Haft 2, 1931—Kring den praktiska nationalekonomiens problematik: *Gunnar Myrdal.* Ricardos teori om internationella subsidielikvider. En komplettering: *D.D.*

SWITZERLAND—

Journal de Statistique et Revue Économique Suisse—

Fasc. 2, 1931—Die dänische Landwirtschaft an dem Weltmarkte: *Chr. Sonne.* Mitteilung über statistische Unterlagen zu einer Tuberkuloseversicherung: *Eduard Niederer.* L'augmentation de la stature en Suisse au cours de 25 ans: *Eugène Pittard* and *M. Dellenbach.*

Fasc. 3, 1931—Rationale und traditionale Finanzwirtschaft in der Schweiz, II: *Salome Schneider.* Die wirtschaftspolitischen Strömungen der Nachkriegszeit: *Wilhelm Schweizer.*

Fasc. 4, 1931—Systeme der Kreditversicherung: *A. Machler.*

INTERNATIONAL—

International Labour Review—

October, 1931—Finance and industry: the international significance of the Macmillan Report: *P. W. Martin.* The use of the Employment Exchange service in Great Britain as a Labour Clearing House. Statistics of cost of living and of migration.

November, 1931—A world programme of organic economic reconstruction: *G. de Michelis.* The international regulation of hours of work in coal-mines. Woman labour in India, II: *R. K. Das.*

December, 1931—Is unemployment insurance a cause of permanent unemployment? *E. Maurette.* Finance and industry: the Macmillan Report as a basis for international action: *P. W. Martin.* The new Commonwealth of Australia Conciliation and Arbitration Act: *O. de R. Foenander.*

ADDITIONS TO THE LIBRARY.

Since the issue of Part IV, 1931, the Society has received the publications enumerated below:—

I.—OFFICIAL PUBLICATIONS.

(a) United Kingdom and its several Divisions.

United Kingdom—

Agriculture and Fisheries, Ministry of—
Economic series.
8—Report on agricultural credit. 1927. 104 pp.;
16—The fluid milk market in England and Wales. By *R. B. Forrester.* 1927. 141 pp.;
19—Markets and fairs in England and Wales (Part III. Northern markets). 1928. 179 pp.;
21—Report on the preparation of fruit for market (Part I — apples, pears, plums, and strawberries). 1928. 88 pp.;
23—Markets and fairs in England and Wales (Part IV—Eastern and southern markets). 1929. 221 pp.;
29—Report on the marketing of sheep, mutton, and lamb in England and Wales. 1931. 186 pp.;
34—Report on the organization of potato marketing. 1931. 175 pp.
London: H.M.S.O., 1931. 9½″ × 6″. 6*d.* each.

Colonial Office—
British Guiana, Financial situation of. Report of a commission appointed by the Secretary of State for the Colonies, June, 1931. London: H.M.S.O., 1931. 9½″ × 6″; 63 pp. 1*s.*
Colonial Directors of Agriculture, Report and proceedings of Conference. July, 1931. London: H.M.S.O., 1931. 9½″ × 6″; 81 pp. 1*s.* 3*d.*
Hong Kong currency. Report of a commission appointed by the Secretary of State for the Colonies, May, 1931. London: H.M.S.O., 1931. 9½″ × 6″; 67 pp. 1*s.*

Education, Board of. Report of the Committee of Inquiry into Problems connected with Defective Vision in School-children. London: H.M.S.O., 1931. 9½″ × 6″; 54 pp. 9*d.*

Empire Marketing Board—
Production and Trade of the following countries:—Cyprus (Aug. 1931), 18 pp.; Falkland Islands (Nov. 1931), 14 pp.; Fiji (Dec. 1931), 15 pp.; Gambia (Sept. 1931), 14 pp.; Mauritius (July, 1931), 16 pp. London: H.M.S.O. 9¾″ × 7½″. 2*d.* each.
Dairy research. A report . . . by *Sir William Dampier.* London: H.M.S.O., 1931. 9¾″ × 7¼″; 60 pp. 1*s.*
Transport and storage of bananas with special reference to chilling. London: H.M.S.O., 1931. 9¾″ × 7¼″; 37 pp. 1*s.*

Government Actuary's Department. Police pensions. Report by the Government Actuary. December 31, 1930. London: H.M.S.O., 1931. 9½″ × 6″; 28 pp. 6*d.*

Health, Ministry of—
Reports on public health and medical subjects. No. 65. A review of certain aspects of the control of cerebro-spinal fever in relation particularly to a scheme for collecting the results of serum treatment. London: H.M.S.O., 1931. 9¾″ × 6¼″; 23 pp. 6*d.*
Inter-Departmental Committee on the Rent Restrictions Act. Report. London: H.M.S.O., 1931. 9¾″ × 6″; 62 pp. 1*s.*

(a) United Kingdom and its several Divisions—*Contd.*

United Kingdom—

Labour, Ministry of. The unemployment problem in Germany. Translation of the report of an advisory commission appointed by the Federal Government. London: H.M.S.O., 1931. 9½″ × 6″; 101 pp. 1*s.* 6*d.*

Overseas Trade, Department of—

Reports on commercial, financial, and economic conditions, as follows: Bolivia (May, 1931), 1*s.*; Canary Islands (Aug. 1931), 1*s.* 9*d.*; Chile (1930), 3*s.*; Egypt (July, 1931), 4*s.*; Finland (July, 1931), 2*s.*; Germany (Sept., 1931), 4*s.*; Italy (June, 1931), 4*s.*; Netherlands East Indies (Sept., 1931), 3*s.* 6*d.*; Newfoundland (June, 1931), 2*s.*; Palestine (July, 1931), 1*s.* 6*d.*; Union of South Africa (July, 1931), 2*s.* London: H.M.S.O., 9½″ × 6″.

Union of Soviet Socialist Republics, Organization of foreign trade of. Report by the Commercial Counsellor to H.M. Embassy in Moscow. May, 1931. London: H.M.S.O., 1931. 9¼″ × 6″; 38 pp. 9*d.*

Labour in India, Royal Commission on. Report. London: H.M.S.O., 1931. 9¾″ × 6″; xviii + 580 pp. 4*s.* 6*d.*

Licensing (Scotland), Royal Commission on. Report. London: H.M.S.O., 1931. 9¾″ × 6″; 94 pp. 1*s.* 6*d.*

Select Committee on Shop Assistants, Report. Vol. I. Report, together with the proceedings of the Committee. Vol. II. Appendices. London: H.M.S.O., 1931. 9½″ × 6″; 2 vols. 6*s.*

Unemployment Insurance, Royal Commission on. Appendices to the minutes of evidence. Part IV. Memoranda by the Ministry of Labour on unemployment insurance in oversea countries. London: H.M.S.O., 1931. 13½″ × 8¼″; 39 pp. 3*s.* 6*d.*

Trade, Board of—

Third census of production of the United Kingdom (1924), Final report.

The chemical and allied trades, the leather, rubber and canvas goods trades, the paper, printing and allied trades, and miscellaneous trades. xv + 468 pp. 7*s.*

The iron and steel trades, the engineering trades, and the non-ferrous metals trades. xv + 451 pp. 7*s.* 6*d.* London: H.M.S.O., 1931. 9½″ × 6″.

Northern Ireland—

Finance, Ministry of—

The Registrar-General's review of vital statistics of Northern Ireland and life tables (1926). Belfast: H.M.S.O., 1931. 13¼″ × 8½″; vii + 68 pp. 5*s.*

Ulster Year Book, 1929. Belfast: H.M.S.O., 1929. 9½″ × 5¾″; xvii + 237 pp. 1*s.*

Scotland—

Census Office. Census of Scotland 1931. Preliminary report. Edinburgh: H.M.S.O., 1931. 13¼″ × 8¼″; xv + 49 pp. 3*s.*

(b) India, Dominions, Colonies, and Protectorates.

India—

Agriculture in India, Royal Commission on. Abridged report (100 pp.). Report (xviii + 755 pp.), 1 vol. 11*s.* 3*d.* Appendix to report. 432 pp. 7*s.* 9*d.* Calcutta: Central Publication Branch (London: H.M.S.O.), 1928.

Meteorological Department. Scientific notes.

Vol. III. No. 22—The structure and movement of a storm in the Bay of Bengal during the period 13th to 19th November, 1928. 4*s.* 3*d.*;

— 23—Historical note on the catch of rain-gauges. 1*s.* 9*d.*;

— 25—Heights of base of clouds in India as determined from pilot balloon ascents. 6*d.*;

(b) India, Dominions, Colonies, and Protectorates—*Contd.*

India—

Meteorological Department. Scientific notes.
Vol. III. No. 26—Some statistical relations of temperature over Agra (1926–29) and Batavia (1910–15). 5*d.*;
— 28—Horizontal gradients of pressure and temperature in the upper atmosphere over India calculated from pilot balloon winds. 8*d.*;
— 29—The Bengal cyclone of September 1919. 2*s.*;
— 30—The structure of the sea-breeze at Poona. 9*d.*;
— 31—The lunar atmospheric tide at Kodaikanal and Periyakulam. 5*d.*
Calcutta: Central Publication Branch, 1931. 10″ × 7″.

Punjab. Board of Economic Enquiry. Rural section publication 23. A note on sales of land between the notified agricultural tribes in the Punjab during the quinquennium 1922–23 to 1926–27. Lahore: "C. & M. Gazette" Press, 1931. 9¾″ × 6¼″; 50 pp. 6 *annas.*

Australia—

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MacLean (*F. J.*). The human side of insurance. London: Sampson Low, 1931. 8¾″ × 5¼″; x + 246 pp. 8*s.* 6*d.*

Manoilesco (*Mihail*). The theory of protection and international trade. London: P. S. King, 1931. 8½″ × 5¼″; xxxi + 262 pp. 12*s.* 6*d.*

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Sanders (*J.*). The declining birth-rate in Rotterdam; a statistical analysis of the drop in the number of children in 24,644 Rotterdam families during the last fifty years. The Hague: Nijhoff, 1931. 10″ × 6½″; ix + 179 pp. 6 *guilders.*

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Tippett (*L. H. C.*). The methods of statistics; an introduction mainly for workers in the biological sciences. London: Williams and Norgate, 1931. 8½″ × 5½″; 222 pp. 15*s.*

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Wigglesworth (*F.*) and (*A.*). The gold tangle and the way out. Meaning and causes of the great industrial collapse. London: John Lane, 1931. 7¼″ × 4¾″; x + 245 pp. 5*s.*

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Wishart (*J.*). The mean and second moment coefficient of the multiple correlation coefficient, in samples from a normal population. Reprinted from *Biometrika*, May, 1931. 10¾″ × 7½″; 9 pp. (From the Author.)

REVENUE OF THE UNITED KINGDOM.

Net Produce in Quarters of 1931, *and in Financial Years ended March* 31, 1930-31, 1929-30, 1928-29, 1927-28.

(000's omitted.)

QUARTERS, ended	March 31, 1931.	June 30, 1931	Sept. 30, 1931.	Dec. 31, 1931.	Total for calendar year 1931
	£	£	£	£	£
Customs	30,387	28,860	36,107	35,806	131,160
Excise	28,500	27,300	29,300	34,300	119,400
Stamps and Estate Duties	29,660	22,210	18,650	17,930	88,450
Land Tax, House Duty and Mineral Rights Duty	650	130	50	10	840
Postal Service	16,600	16,400	17,700	18,100	68,800
Telegraph Service					
Telephone Service					
	105,797	94,900	101,807	106,146	408,650
Property and Income Tax, including Super-tax	226,720	30,998	38,391	28,683	324,792
	332,517	125,898	140,198	134,829	733,442
Excess Profits Duties, etc.	3,000	—	—	—	3,000
Corporation Profits Tax					
Motor Vehicle Duties	17,192	4,267	3,529	2,832	27,820
Crown Lands	230	270	350	390	1,240
Interest on Sundry Loans	6,192	9,384	2,700	434	18,710
Miscellaneous and special receipts	12,139	5,769	1,342	8,683	27,933
Appropriation from Rating Relief Suspense Account	—	—	3,900	—	3,900
Totals	371,270	145,588	152,019	147,168	816,045

YEARS, ended March 31,	1930-31.	1929-30.	1930-31 (compared with 1929-30).		Corresponding years.	
			Increase.	Decrease.	1928-29.	1927-28.
	£	£	£	£	£	£
Customs	121,401	119,888	1,513	—	118,972	111,620
Excise	124,000	127,500	—	3,500	134,000	139,200
Stamps and Estate Duties	103,260	105,440	—	2,180	110,630	104,340
Land Tax, House Duty and Mineral Rights Duty	830	880	—	50	840	780
Postal Service	69,100	68,100	1,000	—	65,300	38,250
Telegraph Service						6,100
Telephone Service						18,650
	418,591	421,808	2,513	5,730	429,742	418,940
Property and Income Tax, including Super-tax	323,877	293,816	30,061	—	293,770	311,183
	712,468	715,624	32,574	5,730	723,512	730,123
Excess Profits Duties, etc.	3,000	2,250	750	—	850	—
Corporation Profits Tax					850	1,780
Motor Vehicle Duties	27,792	26,802	990	—	25,357	24,518
Crown Lands	1,280	1,290	—	10	1,210	1,070
Interest on Sundry Loans	32,890	32,639	251	—	28,111	23,952
Miscellaneous— Ordinary receipts	34,330	36,365	—	2,034	13,143	30,893
Special receipts					43,402	30,488
Appropriation from Rating Relief Suspense Account	16,000	—	16,000	—	—	—
Totals	857,760	814,970	50,565	7,774	836,435	842,824
			NET INCR. £42,791			

Values (c.i.f.) of **Imports*** *into the United Kingdom for the years* **1929-30-31.**

(From the Monthly Trade Returns, December, 1931.)

	Year ended December 31,			Increase (+) or Decrease (—) in 1931 as compared with 1930.	Increase (+) or Decrease (—) in 1931 as compared with 1929.
	1929.	1930.	1931.		
I. FOOD, DRINK AND TOBACCO—	£	£	£	£	£
A. Grain and flour	95,914,625	72,803,831	55,816,753	— 16,987,078	— 40,097,872
B. Feeding-stuffs for animals	9,602,904	5,745,034	5,365,066	— 379,968	— 4,237,838
C. Meat	113,574,647	111,526,075	93,937,910	— 17,588,165	— 19,636,737
D. Animals, living, for food	16,376,347	15,317,811	16,014,663	— 2,303,148	— 361,684
†E. Other food and drink, non-dutiable	213,868,071	193,106,958	182,131,274	— 10,975,684	— 31,736.797
†F. Other food and drink, dutiable	67,639,710	57,896,552	52,349,446	— 5,547,106	— 15,290,264
G. Tobacco	18,498,531	15,719,822	11,383,993	— 4,335,829	— 7,114,538
Total, Class I	535,474,835	475,116,083	416,999,105	— 58,116,978	—118,475,730
II. RAW MATERIALS AND ARTICLES MAINLY UNMANUFACTURED—					
A. Coal	32,890	29,120	34,381	+ 5,261	+ 1,491
B. Other non-metallic mining and quarry products and the like	5,967,073	5,268,317	3,929,244	— 1,339,073	— 2,037,829
C. Iron ore and scrap	6,438,283	5,161,302	2,340,868	— 2,820,434	— 4,097,415
D. Non-ferrous metalliferous ores and scrap	17,007,160	12,231,998	7,241,255	— 4,990,743	— 9,765,905
E. Wood and timber	45,840,135	42,774,541	29,144,442	— 13,630,099	— 16,695,693
F. Raw cotton and cotton waste	77,365,789	44,989,749	27,153,009	— 17,836,740	— 50,212,780
G. Wool, raw, and waste, and woollen rags	63,012,117	45,102,389	34,817,977	— 10,284,412	— 28,194,140
H. Silk, raw, knubs and noils	1,901,003	1,515,363	1,238,562	— 276,801	— 662,441
I. Other textile materials	15,224,506	9,584,083	7,045,525	— 2,538,558	— 8,178,981
J. Oil seeds, nuts, oils, fats, resins and gums	43,928,333	33,658,484	25,004,142	— 8,654.342	— 18,924,191
K. Hides and skins, undressed	20,416,927	16,126,020	11,710,119	— 4,415,901	— 8,706,808
L. Paper-making materials	13,149,617	12,073,971	9,980,452	— 2,093,519	— 3,169,165
M. Rubber	17,286,054	10,722,498	4,496,503	— 6,225,995	— 12,789,551
N. Miscellaneous raw materials and articles mainly unmanufactured	12,007,105	11,220,980	9,230,247	— 1,990,733	— 2,776,858
Total, Class II	339,576,992	250,458,815	173,366,726	— 77,092,089	—166,210,266
III. ARTICLES WHOLLY OR MAINLY MANUFACTURED—					
A. Coke and manufactured fuel	17,660	10,000	18,187	+ 8,187	+ 527
B. Pottery, glass, abrasives, &c.	11,297,353	10,900,454	9,600,819	— 1,299,635	— 1,696,534
C. Iron and steel and manufactures thereof	24,690,225	23,298,894	19,637,751	— 3,661,143	— 5,052,474
D. Non-ferrous metals and manufactures thereof	37,016,156	29,362,996	21,413,416	— 7,949,580	— 15,602,740
E. Cutlery, hardware, implements, and instruments	8,266,336	7,702,204	7,328,160	— 374,044	— 938,176
F. Electrical goods and apparatus	6,510,079	7,026,676	6,252,174	— 774,502	— 257,905
G. Machinery	19,153,160	17,920,478	15,345,457	— 2,575,021	— 3,807,703
H. Manufactures of wood and timber	9,683,514	8,738,641	7,537,387	— 1,201,254	— 2,146,127
I. Cotton yarns and manufactures	10,938,907	9,735,503	8,940,939	— 794,564	— 1,997,968
J. Woollen and worsted yarns and manufactures	16,225,139	14,266,774	13,452,412	— 814,362	— 2,772,727
K. Silk and silk manufactures	13,173,595	11,220,901	8,395,193	— 2,825.708	— 4,778,402
L. Manufactures of other textile materials	17,121,089	15,334,860	14,951,000	— 383,860	— 2,170,089
M. Apparel	19,955,678	19,290,632	19.907,570	+ 616,938	— 48,108
N. Chemicals, drugs, dyes and colours	16,882,022	13,571,388	13,870,056	+ 298,668	— 3,011,966
O. Oils, fats and resins, manufactured	43,428,462	46,241,999	29,445,099	— 16,796,900	— 13,983,363

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* The value of the Imports represents the cost, insurance and freight; or, when goods are consigned for sale, the latest sale value of such goods.

† Duty on Tea repealed as from 22nd April, 1929, inclusive. Figures transferred from Group F to Group E.

Values (c.i.f.) of **Imports** *for the years* **1929-30-31**—*Contd.*

(From the Monthly Trade Returns, December, 1931.)

	Year ended December 31,			Increase (+) or Decrease (—) in 1931 as compared with 1930.	Increase (+) or Decrease (—) in 1931 as compared with 1929.
	1929.	1930.	1931.		
III. ARTICLES WHOLLY OR MAINLY MANUFACTURED—*Contd.*	£	£	£	£	£
P. Leather and manufactures thereof	15,821,576	15,255,874	13,242,937	— 2,012,937	— 2,578,639
Q. Paper and cardboard	17,972,297	17,975,372	16,439,669	— 1,535,703	— 1,532,628
R. Vehicles (including locomotives, ships and aircraft)	10,758,809	6,827,794	4,239,167	— 2,588,627	— 6,519,642
S. Rubber manufactures	3,757,076	3,927,290	3,428,328	— 498,962	— 328,748
T. Miscellaneous articles, wholly or mainly manufactured	31,692,431	28,809,145	28,526,677	— 282,468	— 3,165,754
Total, Class III	334,361,564	307,417,875	261,972,398	— 45 445 477	— 72,389,166
IV. ANIMALS, NOT FOR FOOD	3,527,125	3,679,927	3,330,070	— 349,857	— 197,055
V. PARCEL POST, NON-DUTIABLE ARTICLES	7,824,784	7,302,561	6,506,410	— 796,151	— 1,318,374
Total	1,220,765,300	1,043,975,261	862,174,709	—181,800,552	—358,590,591

Values (f.o.b.) of **Exports*** *of Produce and Manufactures of the United Kingdom for the years* **1929-30-31.**

(From the Monthly Trade Returns, December, 1931.)

	Year ended December 31,			Increase (+) or Decrease (—) in 1931 as compared with 1930.	Increase (+) or Decrease (—) in 1931 as compared with 1929.
	1929.	1930.	1931.		
I. FOOD, DRINK AND TOBACCO—	£	£	£	£	£
A. Grain and flour	4,829,389	4,256,047	3,316,335	— 939,712	— 1,513,054
B. Feeding-stuffs for animals	3,078,087	2,171,957	2,087,564	— 84,393	— 990,523
C. Meat	1,724,188	1,487,813	1,230,511	— 257,302	— 493,677
D. Animals, living, for food	206,142	221,633	171,989	— 49,644	— 34,153
E. and F. Other food and drink	36,261,936	31,598,429	23,506,551	— 8,091,878	— 12,755,385
G. Tobacco	9,556,327	8,482,673	5,216,380	— 3,266,293	— 4,339,947.
Total, Class I	55,656,069	48,218,552	35,529,330	— 12,689,222	— 20,126,739
II. RAW MATERIALS AND ARTICLES MAINLY UNMANUFACTURED—					
A. Coal	48,616,811	45,661,280	31,653,774	— 11,007,506	— 13,963,037
B. Other non-metallic mining and quarry products and the like	1,994,666	1,649,781	1,111,279	— 538,502	— 883,387
C. Iron ore and scrap	1,501,619	568,200	422,750	— 145,450	— 1,078,869
D. Non-ferrous metalliferous ores and scrap	1,691,520	751,402	456,672	— 294,730	— 1,234,848
E. Wood and timber	372,019	281,015	235,964	— 45,051	— 136,055
F. Raw cotton and cotton waste	1,150,541	600,209	331,547	— 268,662	— 818,994
G. Wool, raw, and waste, and woollen rags	9,621,916	4,810,931	3,268,921	— 1,542,010	— 6,352,995
H. Silk, raw, knubs and noils	28,050	14,195	11,963	— 2,232	— 16,087
I. Other textile materials	419,853	267,770	201,335	— 66,435	— 218,518
J. Oil seeds, nuts, oils, fats, resins and gums	5,159,401	3,618,620	2,438,216	— 1,180,404	— 2,721,185
K. Hides and skins, undressed	2,638,049	1,438,042	742,176	— 695,866	— 1,895,873
L. Paper-making materials	1,569,265	1,048,109	687,239	— 360,870	— 882,026
M. Rubber	276,997	174,600	104,920	— 69,680	— 172,077
N. Miscellaneous raw materials and articles mainly unmanufactured	3,859,931	2,876,344	2,424,881	— 451,463	— 1,435,050
Total, Class II	78,900,638	63,760,498	47,091,637	— 16,668,861	— 31,809,001

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* The value of the Exports represents the cost and the charges of delivering the goods on board the ship, and is known as the "free on board" value.

Values (f.o.b.) of **Exports** *for the years* **1929-30-31**—*Contd*

(From the Monthly Trade Returns, December, 1931)

	Year ended December 31,			Increase (+) or Decrease (—) in 1931 as compared with 1930	Increase (+) or Decrease (—) in 1931 as compared with 1929
	1929.	1930.	1931.		
III. ARTICLES WHOLLY OR MAINLY MANUFACTURED—	£	£	£	£	£
A Coke and manufactured fuel	4,232,807	3,547,800	2,965,449	— 582 351	— 1 267,358
B Pottery, glass, abrasives, &c	14,004,563	11,900,652	8,380,560	— 3,520,092	— 5,624,003
C. Iron and steel and manufactures thereof	68,002,782	51,261,119	30,410,185	— 20,850,934	— 37,592,597
D Non ferrous metals and manufactures thereof	18,293,244	12,037,798	6,934,865	— 5,102,933	— 11 358,379
E Cutlery, hardware, implements and instruments	9,333,144	7,336,254	5,333,526	— 2 002,728	— 3 999,618
F Electrical goods and apparatus	13,159,465	11,927,934	7,437 944	— 4 489 990	— 5 721 521
G Machinery	54,350,821	46,974,006	32,839,207	— 14 134 799	— 21,511 614
H Manufactures of wood and timber .	3,002,284	2,215,409	1,426,965	— 788,144	— 1,575,319
I Cotton yarns and manufactures	135,449,458	87,586,591	56,593,019	— 30,993,572	— 78,856,439
J. Woollen and worsted yarns and manufactures	52,883,047	36,962,726	25,150,313	— 11,812,413	— 27,732,734
K Silk and silk manufactures	2,167,930	1,555,561	1,037,560	— 518 001	— 1,130,370
L Manufactures of other textile materials	26,865,287	19,557,521	12,888,769	— 6 668 752	— 13,976,518
M. Apparel	25,611,557	19,768,021	14,015,331	— 5 752 690	— 11 596,226
N. Chemicals, drugs, dyes and colours	26,617,229	21,958,476	17,043,322	— 4,915,154	— 9 573,907
O. Oils, fats and resins, manufactured	8,599,178	7,459,809	5 306,051	— 2,153,758	— 3 293,127
P. Leather and manufactures thereof	7,904,997	5,261,906	3,314,118	— 1,947 788	— 4 590,879
Q. Paper and cardboard	9,809,353	8,468,315	6,322,981	— 2 145 334	— 3 486,372
R. Vehicles (including locomotives, ships and aircraft)	50,269,355	50,992,306	28,417,828	— 22,574 478	— 21,851,527
S. Rubber manufactures	3,404,534	2,829,532	2,137 182	— 692 350	— 1 267,352
T. Miscellaneous articles wholly or mainly manufactured	39,838,454	30,440,040	22,617,904	— 7,822 136	— 17,220,550
Total, Class III .	573,799,489	440,041,779	290 573,079	—149 468,700	—283,226,410
IV. ANIMALS, NOT FOR FOOD	2,025,272	1,502,029	1 092,774	— 409,255	— 932,498
V. PARCEL POST	18,967,854	17,232,558	14 876,997	— 2 355 561	— 4 090,857
Total .	729,349,322	570,755,416	389,163,817	—181,591,599	—340,185,505

*Values (f o b *) of* **Exports of Imported Merchandise** *for the years* **1929-30-31.**

(From the Monthly Trade Returns December, 1931)

	Year ended December 31,			Increase (+) or Decrease (—) in 1931 as compared with 1930	Increase (+) or Decrease (—) in 1931 as compared with 1929
	1929	1930	1931		
I FOOD DRINK AND TOBACCO—	£	£	£	£	£
A Grain and flour	1,821,321	1,722,496	1,019 219	— 703 277	— 802 102
B Feeding stuffs for animals	247,051	189,881	166 295	— 23 586	— 80 756
C Meat	3,581 090	3,202,645	2,632 368	— 570 277	— 948 722
D Animals, living, for food	2,523	2,609	1,071	— 1 538	— 1,452
†E Other food and drink, non dutiable	15,201,581	13,646 390	12,407,585	— 1 238,805	— 2,793,996
†F Other food and drink dutiable	4 401 520	4,053 133	3 328,768	— 724 365	— 1 072 752
G. Tobacco	757,481	939 075	607,275	— 331 800	— 150 206
Total, Class I	26,012 567	23,756,229	20,162,581	— 3 593,648	— 5,849,986

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* The value of the Exports represents the cost and the charges of delivering the goods on board the ship, and is known as the "free on board" value

† Duty on Tea repealed as from April 22, 1929, inclusive Figures transferred from Group F to Group E

Values (f o b) of **Exports of Imported Merchandise** *for the years* **1929-30-31**—*Contd*

(From the Monthly Trade Returns, December, 1931)

	Year ended December 31			Increase (+) or Decrease (—) in 1931 as compared with 1930	Increase (+) or Decrease (—) in 1931 as compared with 1929
	1929	1930	1931		
II RAW MATERIALS AND ARTICLES MAINLY UNMANUFACTURED—	£	£	£	£	£
A Coal	—	—	—	—	—
B Other non metallic mining and quarry products and the like	490,888	368,624	212,329	— 156,295	— 278,559
C Iron ore and scrap	3,969	5,117	1,750	— 3,367	— 2,219
D Non ferrous metalliferous ores and scrap	399,583	245,330	187,694	— 57,636	— 211,889
E Wood and timber	717,604	456,093	289,089	— 167,004	— 428,515
F Raw cotton and cotton waste	4,567,724	3,379,703	1,208,095	— 2,171,608	— 3,359,629
G Wool, raw and waste, and woollen rags	24,910,312	16,893,708	11,072,884	— 5,820,824	— 13,837,428
H Silk, raw, knubs and noils	13,849	16,729	8,598	— 8,131	— 5,251
I Other textile materials	1,049,850	781,327	454,358	— 326,969	— 595,492
J Oil seeds, nuts, oils, fats, resins and gums	2,118,945	1,453,534	899,568	— 553,966	— 1,219,377
K Hides and skins, undressed	12,773,139	9,862,799	8,465,388	— 1,397,411	— 4,307,751
L Paper making materials	51,095	26,819	64,861	+ 38,042	+ 13,766
M Rubber	5,431,432	3,596,453	1,816,417	— 1,780,036	— 3,615,015
N Miscellaneous raw materials and articles mainly unmanufactured	1,764,339	1,283,119	1,086,449	— 196,670	— 677,890
Total, Class II	54,292,732	38,369,355	25,767,483	— 12,601,872	— 28,525,249
III ARTICLES WHOLLY OR MAINLY MANUFACTURED—					
A Coke and manufactured fuel	119	81	446	+ 365	+ 327
B Pottery, glass, abrasives, &c	186,090	161,303	114,997	— 46,306	— 71,093
C Iron and steel and manufactures thereof	220,450	265,171	177,354	— 87,817	— 43,096
D Non ferrous metals and manufactures thereof	4,401,106	2,795,380	1,518,517	— 1,276,863	— 2,882,589
E Cutlery, hardware, implements and instruments	1,374,198	1,310,139	1,021,697	— 288,442	— 352,501
F Electrical goods and apparatus	219,622	484,645	215,981	— 268,664	— 3,641
G Machinery	1,630,368	1,556,545	1,215,699	— 340,846	— 414,669
H Manufactures of wood and timber	649,047	622,171	470,891	— 151,280	— 178,156
I Cotton yarns and manufactures	808,710	545,683	345,248	— 200,435	— 463,462
J Woollen and worsted yarns and manufactures	2,282,825	1,567,822	1,026,572	— 541,250	— 1,256,253
K Silk and silk manufactures	1,391,186	1,100,054	584,408	— 515,646	— 806,778
L Manufactures of other textile materials	2,325,662	2,207,385	1,522,313	— 685,072	— 803,349
M Apparel	1,283,449	1,276,488	1,187,128	— 89,360	— 96,321
N Chemicals, drugs, dyes, and colours	957,577	939,241	1,135,059	+ 195,818	+ 177,482
O Oils, fats and resins, manufactured	3,968,072	2,823,733	1,865,584	— 958,149	— 2,102,488
P Leather and manufactures thereof	2,232,962	1,904,986	1,506,415	— 398,571	— 726,547
Q Paper and cardboard	268,853	269,041	192,968	— 76,073	— 75,885
R Vehicles (including locomotives, ships and aircraft)	683,454	639,320	447,478	— 191,842	— 235,976
S Rubber manufactures	138,450	118,034	101,529	— 16,505	— 36,921
T Miscellaneous articles wholly or mainly manufactured	3,875,095	3,487,511	2,846,922	— 640,589	— 1,028,173
Total, Class III	28,897,295	24,074,733	17,497,206	— 6,577,527	— 11,400,089
IV ANIMALS, NOT FOR FOOD	499,234	635,092	608,077	— 27,015	+ 108,843
Total	109,701,828	86,835,409	64,035,347	— 22,800,062	— 45,666,481

BANK OF ENGLAND.

Pursuant to the Act 7th and 8th Victoria, cap 32 (1844),

(000 s omitted)

1	2	3	4	5	6	7	8
		ISSUE DEPARTMENT				COLLATERAL COLUMNS	
Liabilities	DATES	Assets				Notes in Hands of Public (col 1 less Notes in Reserve, col 17)	Minimum Discount Rate
Notes Issued	(Wednesdays)	Govt Debt (£11 015) and Govt Securities	Other Securities	Gold Coin and Bullion	Silver Coin		
£	1931	£	£	£	£	£	Per cent
405,916	Jan 7	244,158	11,477	145,916	4,365	363,504	3
404,543	„ 14	244,162	11,477	144,543	4,361	349,943	
402,220	„ 21	244,161	11,477	142,220	4,362	346,462	
399,486	„ 28	243,161	12,477	139,486	4,362	346,824	
400,351	Feb 4	243,159	12,477	140,351	4,364	349,486	
400,528	„ 11	242,490	13,147	140,528	4,363	347,245	
400,443	„ 18	241,794	13,845	140,443	4,361	344,131	
400,816	„ 25	244,963	10,680	140,816	4,357	347,665	
400,926	Mar 4	249,123	6,533	140,926	4,344	350,722	
400,926	„ 11	244,609	11,031	140,926	4,360	350,327	
401,957	„ 18	243,382	12,247	141,957	4,371	347,287	
403,611	„ 25	242,423	13,488	143,611	4,089	348,808	
404,465	Apr 1	243,008	12,946	144,465	4,046	357,057	
406,122	„ 8	245,232	10,691	146,122	4,077	358,885	
405,313	„ 15	243,684	12,225	145,313	4,091	354,364	
405,864	„ 22	244,683	11,241	145,864	4,076	348,444	
406,280	„ 29	242,465	13,442	146,280	4,093	349,815	
407,506	May 6	243,965	11,943	147,506	4,092	356,217	
408,977	„ 13	242,082	13,826	148,977	4,092	353,127	
410,173	„ 20	242,136	13,775	150,173	4,089	351,541	2½
411,017	„ 27	245,727	10,177	151,017	4,096	354,860	
411,876	June 3	244,194	11,707	151,876	4,099	356,371	
415,256	„ 10	244,624	11,275	155,256	4,101	354,251	
420,926	„ 17	243,701	12,207	160,926	4,092	352,766	
422,894	„ 24	243,227	12,685	162,894	4,088	352,831	
423,272	July 1	242,372	13,535	163,272	4,093	357,430	
424,619	„ 8	243,427	12,483	164,619	4,090	359,258	
423,991	„ 15	243,254	12,656	163,991	4,090	358,013	
408,774	„ 22	244,283	11,626	148,774	4,091	356,098	
392,035	„ 29	250,259	5,648	132,035	4,093	359,362	3½
408,517	Aug 5	268,330	2,577	133,517	4,093	365,252	4½
406,998	„ 12	269,310	1,593	131,998	4,097	360,051	
408,560	„ 19	267,729	3,182	133,560	4,089	354,129	
408,341	„ 26	268,801	2,114	133,341	4,085	350,311	
409,336	Sept 2	268,110	2,798	134,336	4,092	354,976	
410,895	„ 9	266,150	4,771	135,895	4,079	353,931	
410,574	„ 16	261,135	9,811	135,574	4,054	351,618	
408,628	„ 23	238,845	32,143	133,628	4,012	352,676	6
409,818	„ 30	246,455	24,502	134,818	4,043	357,209	
410,239	Oct 7	243,793	27,175	135,239	4,034	359,324	
410,359	„ 14	245,200	25,787	135,359	4,013	356,710	
410,674	„ 21	251,599	19,370	135,674	4,031	355,231	
410,677	„ 28	254,529	16,430	135,677	4,041	356,031	
395,690	Nov 4	251,288	19,671	120,690	4,041	358,857	
395,698	„ 11	254,945	16,001	120,698	4,054	357,195	
395,704	„ 18	254,242	16,720	120,704	4,038	354,615	
395,710	„ 25	254,804	16,147	120,710	4,050	354,401	
395,711	Dec 2	256,324	14,624	120,711	4,052	358,458	
395,712	„ 9	255,611	15,343	120,712	4,046	358,850	
395,714	„ 16	257,032	13,918	120,714	4,050	363,534	
395,719	„ 23	253,136	17,814	120,719	4,049	370,031	
364,150	„ 30	253,725	17,222	120,746	4,053	364,150	

WEEKLY RETURN.

for Wednesday in each Week, during the Year **1931.**

(000's omitted.)

9	10	11	12	13	14	15	16	17	18
BANKING DEPARTMENT.									
Liabilities.				DATES.	Assets.				Totals of Liabilities and Assets.
Capital (£11,553) and Rest.	Public Deposits.	Banker's Deposits.	Other Deposits.	(Wednesdays.)	Govt. Securities.	Discounts and Advances.	Other Securities.	Reserve (Notes and Coin).	
£	£	£	£	1931.	£	£	£	£	£
18,029	13,207	68,875	33,293	Jan. 7........	53,081	14,358	22,912	43,054	133,405
18,041	22,377	64,711	33,413	, 14........	52,026	8,356	22,955	55,207	138,544
18,077	22,324	68,813	33,385	,, 21........	49,246	10,995	25,959	56,400	142,600
18,081	19,360	55,163	33,368	,, 28........	41,086	9,748	21,823	53,317	125,974
18,105	9,861	62,576	33,568	Feb. 4........	43,030	6,325	23,204	51,554	124,112
18,131	13,503	57,656	33,960	,, 11........	36,420	9,597	23,233	54,002	123,252
18,156	15,167	61,146	33,141	,, 18........	36,135	9,689	24,715	57,076	127,615
18,223	16,221	59,072	33,312	,, 25........	36,735	8,518	27,650	53,927	126,830
18,259	7,827	66,613	33,412	Mar. 4........	34,395	10,639	30,039	51,040	126,113
18,281	8,757	59,275	33,469	,, 11........	30,435	9,238	28,709	51,402	119,784
18,287	10,500	59,796	33,228	,, 18........	28,905	8,021	29,346	55,540	121,812
18,273	9,500	57,704	33,711	,, 25........	27,695	11,362	24,422	55,711	119,190
18,268	17,243	58,788	34,693	Apr. 1........	30,350	24,629	25,685	48,330	128,994
17,665	9,863	59,507	34,000	,, 8........	33,400	10,890	28,609	48,138	121,037
17,665	8,372	61,230	35,131	,, 15........	34,334	8,376	27,852	51,839	122,401
17,672	13,864	54,785	35,403	,, 22........	30,949	5,982	26,500	58,296	121,727
17,713	17,678	48,924	37,029	,, 29........	31,090	7,198	25,647	57,412	121,347
17,748	5,999	58,572	35,512	May 6........	34,415	5,635	25,523	52,265	117,838
17,753	10,323	62,199	33,966	,, 13........	35,665	6,362	25,343	56,877	124,247
17,760	14,966	56,633	34,026	,, 20........	31,880	5,956	25,890	59,665	123,390
17,776	17,449	54,761	33,820	,, 27........	31,215	6,625	28,553	57,218	123,811
17,795	6,545	72,209	33,921	June 3........	38,496	7,106	28,311	56,563	130,476
17,823	9,627	69,562	33,267	,, 10........	33,121	6,597	28,526	62,037	130,281
17,861	15,017	71,446	33,681	,, 17........	30,846	9,395	28,044	69,721	138,006
17,931	25,249	61,644	33,520	,, 24........	30,401	9,633	27,129	71,182	138,345
18,002	11,490	99,402	34,091	July 1........	32,931	34,319	28,746	66,992	162,988
18,054	15,734	64,543	34,987	,, 8........	31,826	7,102	27,837	66,554	133,319
18,068	15,676	66,429	33,705	,, 15........	30,021	7,407	30,165	66,286	133,879
18,079	16,373	60,179	32,765	,, 22........	34,376	7,099	31,977	53,946	127,398
18,104	15,219	55,798	33,687	,, 29........	52,561	9,696	26,604	33,948	122,809
18,137	11,438	63,437	33,175	Aug. 5........	49,311	9,019	23,283	44,576	126,189
18,151	19,434	58,163	34,879	,, 12........	53,226	7,051	22,098	48,253	130,628
18,191	19,726	61,755	40,099	,, 19........	48,881	6,864	28,286	55,742	139,772
18,232	26,324	53,593	48,708	,, 26........	50,176	9,296	28,052	59,334	146,859
18,252	12,925	60,351	51,838	Sept. 2........	53,736	7,262	26,678	55,692	143,368
18,267	21,808	54,845	50,533	,, 9........	51,146	8,291	27,743	58,276	145,455
18,291	16,573	58,437	50,459	,, 16........	49,391	8,321	25,788	60,263	143,762
18,297	23,018	64,915	50,963	,, 23........	60,176	13,579	26,142	57,298	157,195
18,278	30,089	62,642	52,565	,, 30........	68,976	14,773	25,876	53,951	163,576
17,645	10,594	78,859	51,879	Oct. 7........	64,126	16,898	25,715	52,240	158,979
17,656	14,441	70,099	51,310	,, 14........	57,626	14,077	26,775	55,034	153,512
17,686	19,094	60,575	52,777	,, 21........	53,601	10,422	29,047	56,804	150,074
17,676	17,254	63,477	52,645	,, 28........	50,536	10,548	34,063	55,906	151,053
17,695	19,877	60,936	40,209	Nov. 4........	57,826	10,751	32,090	38,052	138,719
17,721	19,143	60,461	38,343	,, 11........	54,996	11,677	29,356	39,641	135,670
17,732	21,213	59,662	37,617	,, 18........	51,006	12,068	31,000	42,156	136,230
17,776	27,034	59,844	38,140	,, 25........	56,581	12,698	31,233	42,283	142,795
17,841	8,594	86,176	39,296	Dec. 2........	70,016	12,344	31,407	38,142	151,909
17,876	10,674	75,140	38,543	,, 9........	60,616	12,551	31,401	37,667	142,234
17,897	12,027	73,338	38,179	,, 16........	61,466	12,872	34,209	32,894	141,441
17,895	14,641	72,282	38,721	,, 23........	67,606	13,537	36,076	26,322	143,541
17,970	7,733	126,398	40,341	,, 30........	95,341	27,291	37,613	32,199	192,443

FOREIGN EXCHANGES.—*Quotations as under,* LONDON *on Paris, Berlin and Calcutta; New York and Hong Kong on* LONDON, **1931.**

DATE (Wednesdays)	1 London on Paris. Cables (middle rate).	2 London on Berlin. Cables (middle rate).	3 London on Calcutta. Demand (middle rate).	4 New York on London. Cables (closing rate).	5 Hong Kong on London. T.T.	6 Price per Ounce. Gold Bars (fine).	7 Price per Ounce. Silver Standard Bars (cash).
1931.	*f c.*	*Reichmarks.*	*s. d*	*$ c.*	*s. d.*	*s. d.*	*s. d.*
Jan. 7......	123·68½	20·39⅞	1·5¾	4·85	1·0$\frac{5}{16}$	85·0¾	1·1⅞
„ 21......	123·89	20·42¼	1·5¾	4·85	1·0$\frac{1}{16}$	84·11½	1·2
Feb. 4......	123·93¾	20·42⅞	1 5¾	4·86	0 11$\frac{9}{16}$	84·11½	1·0$\frac{7}{16}$
„ 18......	123·92½	20·44	1·5¾	4·86	0 11$\frac{1}{16}$ (19th)	84·10¾	1·0¼
Mar. 4......	124·06½	20·43⅞	1·5¾	4·86	0·11¼	84·10½	1·0⅞
„ 18......	124·18½	20·39$\frac{9}{16}$	1·5$\frac{13}{16}$	4·86	1·0⅜	84·10	1·2$\frac{3}{16}$
Apr. 1......	124·17½	20·39⅝	1·5$\frac{13}{16}$	4·86	1·0¼	84·9¾	1·1$\frac{3}{16}$
„ 15......	124·27½	20·40¼	1·5$\frac{13}{16}$	4·86	1 0$\frac{1}{16}$	84·10	1·1⅜
„ 29......	124·42½	20·42⅜	1·5$\frac{13}{16}$	4·86	1·0⅛	84·9¾	1·1¼
May 13......	124·30½	20·41$\frac{1}{16}$	1·5$\frac{13}{16}$	4·86	1·0$\frac{1}{16}$	84·10½	1·1$\frac{3}{16}$
„ 27......	124·24	20·47¾	1·5$\frac{13}{16}$	4·86	0·11½	84·9¾	1·0⅛
June 10......	124·26½	20·50	1·5¾	4·86	0·11$\frac{19}{32}$	84·11½	1·0$\frac{3}{16}$
„ 24......	124·27½	20·49¼	1 5¾	4·87	1·0¼	84·11	1·1⅜
July 8......	124·11½	20·51	1·5$\frac{25}{32}$	4·86	1·0$\frac{19}{32}$	84·10¾	1·1⅜
„ 22......	123·55½	20·62½	1 5¾	4·84$\frac{1}{16}$	1·0$\frac{1}{16}$	84·11½	1·1
Aug. 5......	123·77½	20·60⅝	1·5¾	4·85$\frac{1}{16}$	1·0$\frac{1}{32}$	84·11¼	1·1⅛
„ 19......	123·95¼	20·51½	1·5¾	4·85⅞	0·11$\frac{23}{32}$	84·11⅜	1·0$\frac{13}{16}$
Sept. 2......	123·96½	20·53	1·5¾	4·86$\frac{5}{32}$	0·11$\frac{29}{32}$	84·9¾	1·0$\frac{13}{16}$
„ 16......	123·97½	20·64	1·5¾	4·85$\frac{31}{32}$	0·11$\frac{15}{16}$	84·10½	1·1
„ 30......	98·62½	16·50	1·5$\frac{23}{32}$	3·92¼	1·2⅜	105·3	1·4$\frac{3}{16}$
Oct. 14......	98·50	17·00	1·5¾	3·89	1·3⅜	106·6	1·5⅛
„ 28......	98·06¼	16·62½	1·5$\frac{31}{32}$	3·90¼	1·2¾	105 9	1·5$\frac{7}{16}$
Nov. 11......	96·65⅜	16·07	1·6⅛	4·87 (12th)	1·6$\frac{5}{16}$	109 0	1·8¾
„ 25......	94·18¾	15·62½	1·6$\frac{3}{32}$	3·62	1·4½	111·10	1·6$\frac{7}{16}$
Dec. 9......	84·12½	13·95	1·6$\frac{1}{16}$	3·28¾	1·6	126·6	1·7¾
„ 23......	86·68¾	14·39½	1 6$\frac{3}{32}$	3 41⅛	1·5⅞	121·10 (22nd)	1·8$\frac{5}{16}$ (22nd)

Vol. XCV.] [Part II.

JOURNAL

OF THE ROYAL STATISTICAL SOCIETY

PART II, 1932.

Proceedings of the Meeting of the Royal Statistical Society 19 January, 1932.

[The President, Sir J. C. Stamp, G.B.E., LL.D., D.Sc., in the Chair.]

At this meeting a discussion took place on a paper prepared in the Industrial Institute having reference to the relations in the period 1850–1912 between the data of the World Stock of Gold Money, Sauerbeck's Commodity Price-Index, and Unemployment in Great Britain.

The Council of the Society had become aware of the fact that the Industrial Institute was at work on this problem and that they had been consulting informally many statisticians and economists, and communicating some of their results to important public bodies. Recognizing that an investigation throwing light upon any aspect of the general problem of the relative part played by monetary and non-monetary factors in determining price movements was of interest in connection with the present economic situation, the Council, departing from their usual procedure, authorized the President to invite the Director of the Institute to read a paper on the work.

The invitation was accepted, and the paper, of which a summary was read, is given on p. 224. The specific problem investigated was defined as follows :—" To find the extent to which movements of the commodity price-index 1850–1912 have been associated with movements in two other factors in the business system, namely, the World's Stock of Gold Money and the Unemployment Returns for Great Britain." The statistical material used for commodity prices was Sauerbeck's Index, while for unemployment the Trade Union percentages of unemployment were used. For the gold factor in addition to the usual figures of world's stocks a series of annual figures was obtained (termed the World's *Relative* Stock of Gold Money) measuring the ratio of actual stocks to the corresponding estimates in a series representing uniform increase at 3·1 per cent. per annum from 1850 onwards. The examination of the variations of the different series was carried out by fitting to the data curves of three types, namely, (1) a simple sine curve, (2) a cubic curve, and (3) a curve of the form $y = a + bx + cx^2 + d \log x$. A close similarity in the long-term movements of the index of wholesale prices and the figures for the relative stock of gold money were found. The deviations of the three series from the fitted curves were also examined and coefficients of correlation were calculated. In these short-period variations a significant correlation was obtained between price movements and relative gold movements, but not between relative gold movements and unemployment, whether the comparisons were made with or without a time lag between the phenomena examined.

The paper suggests certain conclusions to be drawn from the association of the various movements.

The discussion which followed the reading of the summary is reported below, together with written contributions submitted after the meeting by Fellows and others who were present but did not take part in the oral discussion.

DISCUSSION ON THE PAPER
presented by THE INDUSTRIAL INSTITUTE.

MR. UDNY YULE: I am pleased, Mr. President, to move the vote of thanks—a vote of thanks, I take it, to the Industrial Institute, for bringing this paper before the Society for discussion. It offers many points for comment, whether from the economic side or from the standpoint of statistical method. Naturally I will confine myself to the latter, and to be reasonably brief I propose further to limit myself to the conclusion of the first part of the paper—the apparent relation between a long-period movement in the world's stock of monetary gold and British wholesale prices. A standard figure for the gold stock of any one year is calculated by increasing the stock of 1850 at the rate of 3·1 per cent. per annum, and the percentage ratio of the actual stock for the year to the standard stock so calculated is termed the "relative gold." The conclusion is that the movements in "relative gold," so defined, and in wholesale prices, over the period 1850–1912, are very closely parallel.

I do not think that all the mathematical apparatus of the paper is in the least necessary to this conclusion: the mathematics only render the matter unnecessarily obscure. All that is needed is to bring the two graphs together, preferably with the means superposed and the scales made comparable by equalizing standard-deviations. I have done this in the figure on p. 189.

The closeness of fit is certainly remarkable, the small circles showing Sauerbeck's index-numbers of prices being scattered well round the line representing the course of "relative gold," with the exceptions that *circa* 1896 there are a good many points below, and from 1900 to 1912 a good many rather above the line. The correlation between the two series I make 0·938.

There can be no doubt as to the closeness of resemblance between the two graphs, but a good deal of doubt may be felt as to its interpretation. I do not mean doubts arising from questions as to the reliability and the relevance of the data, with which others must deal. I mean doubts that may perhaps be classed under two heads: (1) May the resemblance be possibly fortuitous, or in technical terms the correlation merely a fluctuation of sampling? (2) To what extent is the resemblance dependent on the processes used?

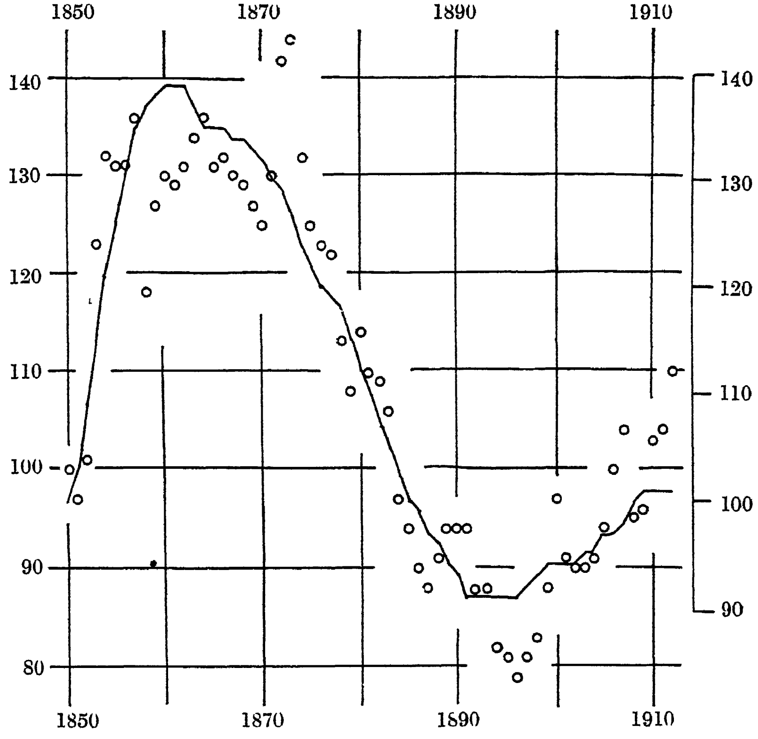


FIG. A.—Graph showing "relative gold" (line) and Sauerbeck's index-numbers of prices (small circles), 1866–1912. The means of the two series have been superposed and their standard-deviations equalized.

On the first head, I hope I shall be forgiven for referring once more to my Presidential Address of 1926, on "Nonsense Correlations between Time Series." My illustrative case (*J.S.S.*, Vol. LXXXIX, p. 3, fig. 1) gave a correlation of 0·951 between standardized mortality and the proportion of Church of England marriages to all marriages for the years 1866 to 1911, and it may be admitted that this correlation is purely fortuitous: yet it is a higher correlation than the one here observed. But, it may be objected, high fortuitous correlations between time-series are due to the fact that any variable is likely to show a general trend, whether upwards or downwards, over a relatively short sample period: the high correlation between mortality and Church of England marriages over the period in question merely means that both were falling. In the present case of "relative gold" and prices the movement is not linear but wavy. This is true, and if we could see several of such waves following one another in gold and in prices, we would have no doubt that they must in some way be related. But here we have only a single wave: it is admitted (Appendix, Note B (2)) that there is no true periodic or oscillatory movement, no precedent waves being obvious in a chart of prices from 1800. Readers will do well to look, say, at the chart in Layton's *Introduction to the Study of Prices*. The resemblance of form shown in the graphs of the paper or in my Fig. A may create some presumption of significance, but not much.

Turn again to Fig. 1 of my Address. Inspection shows that the graphs fit closely, not merely because both are falling, but because there is some resemblance in detail. The line for the proportion of Church of England marriages has a marked hump between 1880 and 1910, and the dots for standardized mortality, though rather widely scattered, suggest a similar hump. Time has not permitted me to do any elaborate work, but I have roughly eliminated the trend and isolated the detailed movement by taking, for each variable, the differences of the annual values from the line joining the first and last points of the graph. The results are shown in Fig. B. Mortality fluctuates so widely from year to year that to bring out the parallelism clearly, I have inserted a dotted line showing the 9-point smooth. It will be seen that the two curves show closely similar movements: from 1866 to about 1885 both tend to run below the base-line, from 1885 to about 1905 both give a marked hump above it. Owing to the wide annual fluctuations in mortality, the correlation between the two original series over 1866–1911 is only 0·597, but if 9-point smooths are taken for both series this rises (1870–1907) to 0·908.

These two cases, Fig. A and Fig. B, are, it seems to me, on the same footing. If we are to regard the correlation in the first case as significant, we must also regard it as significant in the second case. *Per contra*, if we cannot regard it as significant in the second case, there is no reason why we should regard it as significant in the first. And personally I can see no way of rationalizing this correlation between mortality and the proportion of marriages celebrated in the Church of England. I cannot regard it as anything but a "nonsense correlation," a fluke, a fluctuation of sampling. It is true that in my Address I suggested, rather in jest, a possible rationalization of the mere fact that both variables showed a common fall -but this would not apply to the detailed resemblance shown in Fig. B. I cannot, therefore, help thinking that the correlation between "relative gold" and index-numbers of prices may also be a nonsense correlation.

I now turn to my second question, To what extent is the resemblance between the graphs of Fig. A dependent on the processes used? I hope the economists will tell us what they think of these figures for "relative gold." To me the process by which they are obtained seems extraordinarily arbitrary. What is the justification, to begin with,

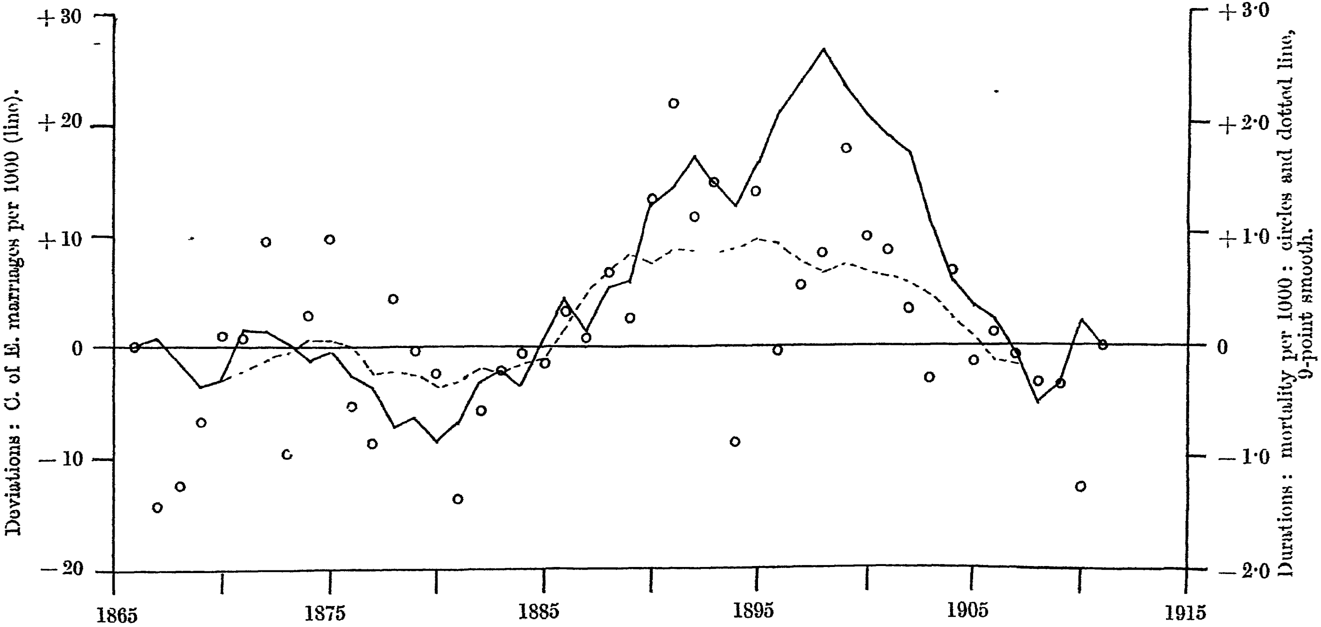


FIG. B.—Compare Fig. 1, *J.S.S.* Vol. LXXXIX, p. 3, showing the correlation between the standardized mortality per 1,000 persons in England and Wales and the proportion of Church of England marriages per 1,000 of all marriages. The above figure shows the deviations of each of these variables from the trend-line joining the first and last points of the graph; mortality, small circles and dotted line showing 9-point smooth; marriages, full line.

of assuming a constant percentage rate of increase in requirements? If we do make this assumption, what is the justification for placing that rate at the figure given by the stocks in 1850 and 1910?

In a draft of the present paper which was circulated to some members of the Council, data were also given for a logarithmic curve fitted to the gold-stock figures by the method of least squares. This gives a mean rate of increase of only 2·377 per cent., not 3·1 per cent. It is a far better fit to the data—whatever that may be worth giving a standard deviation of "relative gold" only 9·36, according to my calculations, against 17·08. The wavy movement of course remains,

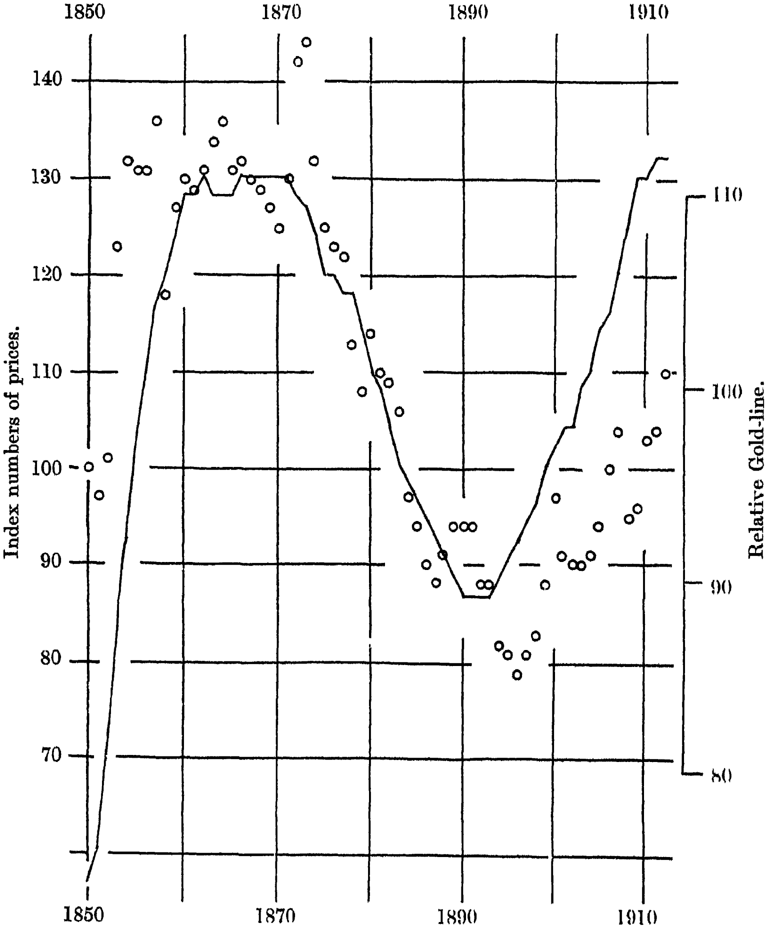


FIG. C.—Graph showing "relative gold" (line) obtained from the logarithmic curve fitted by least squares, and Sauerbeck's index-numbers of prices (small circles), 1866–1912. The means of the two series have been superposed and their standard-deviations equalized. Compare Fig. A.

but on superposing the new graph for "relative gold" on the graph for index-numbers as before it will be seen, as in Fig. C, that the resemblance between the two has been greatly lessened, the gold-line going well *below* prices for the first eight years, preponderantly below them over the whole of the first half of the graph, and well *above* prices for the whole of the last part of the graph from 1894 to 1912. The period of the wave, if one can call it a period, looks markedly lower for gold than for prices, and the correlation has dropped from 0·938 to 0·611 only. The magnitude of the correlation observed is clearly quite largely dependent on the particular process used. Those who know their Peacock may remember that when Mr. MacQuedy remarked, "In the infancy of Society, when government was invented to save a percentage, say two and a half per cent.—," the Rev. Dr. Folliott interrupted him by refusing to say any such thing, and finally by refusing to say any percentage at all. Dr. Folliott was wise. Anyway, I want more adequate reasons for saying 3·1 per cent.

And there is really a similar difficulty in the case of prices. If we know we are given a simple sine curve over exactly a single period, certainly the "trend" is the horizontal through the mean. But here we know nothing of the sort: we know, in fact, if we look at a graph of prices from 1800, that the movement is not periodic, and to me at least that graph does not suggest that the trend from 1866 to 1912 is horizontal. Surely the difficulty is fundamental. If we have, as here, data for some sixty years, and try to obtain a trend-line cutting the original graph in some six to ten points at least, so as to enable us to analyse out short-period fluctuations, diverse methods may lead us to much the same line. But to analyse out a period of about the same length as the data, the trend must cut the original graph, if it is smooth, in three points only. Obviously diverse methods may now give very different results.

On the problem that I have considered in these remarks, my judgment remains in suspense, with a leaning to the view that nothing is proved.

PROFESSOR J. H. JONES: Mr. President, I rise with great pleasure to second the motion of thanks to the Industrial Institute as represented by Mr. Wyld. I have already submitted to the Council and to the Institute a short memorandum upon the paper as it presents itself to a student of economics, and I have asked the Society to permit me to incorporate this memorandum, which is too long to read here, as part of my statement. I shall, therefore, confine my remarks to the point to which Mr. Yule invited economists to address themselves, namely, the significance of the base line employed by the Institute in that part of its investigation which refers to the long period relationship between gold and prices.

The following is the memorandum to which Professor Jones referred, part of which he described in substance:—

Introduction.—In the following notes upon the investigations of the Industrial Institute into the movements of prices, gold supplies and unemployment, I confine myself as far as possible to the economic significance of the data and the conclusions from such data. There are other problems which I cannot pretend to be competent to examine. It is for the pure statistician to decide upon the suitability of the statistical devices employed in the utilization of the fundamental data. Thus, for example, I am not concerned with the question whether it is legitimate to employ parabolic curves rather than periodic types of formula in dealing with a series which produces a shape not shown to appear in successive periods of time. Nor is it my function to consider whether the deviations from a curve fitted arbitrarily (if such be the case) contain any meaning and the correlation between them is of any value. In all that follows I assume that the method of procedure employed by the Institute is defensible.

The investigation is divided into two parts. The first part is concerned with the long-term relation between prices and gold supplies. It is true that a third factor, unemployment, is also examined, but in such examination the writers do no more than labour what was obvious without elaborate mathematical analysis. For that reason it may be ignored. The second part of the investigation is concerned with the connection between gold supplies and cyclical fluctuations in prices and unemployment.

A.

1. At a given price level an increase in the demand for *money* is determined by (*a*) the growth of population, (*b*) the progress of (i) invention and organization, (ii) division of labour.

2. The total demand for gold is the sum of the monetary demand and the non-monetary demand. The former consists of the demand for gold reserves and coins. Other things being equal, the demand for monetary gold varies with such factors as (*a*) a change in the proportion of gold reserves held by the banks; (*b*) a change from a bimetallic to a gold standard; (*c*) a change from silver to gold; (*d*) a resumption of specie payments by a country which has been for some time on a paper standard; (*e*) a growth in the use of notes and cheques. The first of these influences the demand for gold used as reserve and the last for gold used as coin. The remainder influence the demand for both reserve and coins. All these factors have exercised an influence upon the demand for gold at some point in the period under consideration, namely, 1850 1912.

3. The existence of a circular (secular) movement in prices between 1850 and 1912 has been known to economists since the latter year and has been used to illustrate the quantity theory of *money*. It has also been recognized that this movement has represented changes in the relation of the supply of money to the demand for money. Moreover, it is probable that every economist has assumed that the most important single factor influencing the supply of money has been the available supply of monetary gold, so that the curves representing changes in the relative supply of gold and in prices would take the same general shape. It has been assumed, however, that other factors, already specified, have also played a part, and, over a long period, jointly played an important part in the

demand for and the supply of money, and therefore exercised an important influence upon the price level.

4. The statements in the paper submitted by the Institute seem to me to be ambiguous. If the authors merely set out to illustrate the accepted view that long-term variations in gold supplies constitute a factor producing, *ceteris paribus*, variations in the price level, they seem to me to have used an elephant to kill a beetle. For they have added nothing to what is already regarded as amply illustrated by statistics and now beyond dispute. But, if I have understood the paper, they go much farther. Prices are "geometrically correlated" not with money but with gold. The secular movement of prices is determined not merely by the total quantity of money in circulation but actually by the quantity of gold in circulation, and the influence of some variable and enduring factors that have entered during the period has been cancelled by the influence of other variable factors. The Quantity theory of money becomes the Quantity theory of gold. If this statement is true it represents an important contribution to economics.

5. In estimating the value of this conclusion we are faced with two questions. The first relates to the reliability of the fundamental data, and the second to the preparation of such data for subsequent mathematical analysis. The two sets of data are gold supplies and Sauerbeck's price index. The former is international and the latter domestic. This difference between the two sets of data is not highly significant for the purpose of this section of the investigation. The price index is composed mainly of commodities which are important in international trade, so that it represents at least an approximation to an international price index. Moreover, over long periods, individual prices are adjusted to each other. The index is weighted, but weights, though unnecessary, are not misleading and are therefore not a source of weakness. For the purpose of this section of the memorandum, therefore, it seems to me that the Sauerbeck index-number is not of itself likely to constitute a source of serious error. But, while it appears to be not unsuitable for a long-period investigation, I shall try to show later that it is not suitable in dealing with the subject of the second part of the investigation, namely, that concerned with cyclical fluctuations.

6. It is assumed that an increase of 3 per cent. per annum in gold supplies would keep the price level on a horizontal line of trend, and a line representing such increase is taken as the datum line, and the starting-point in the mathematical analysis. This fundamental assumption is either true or false; it is either true or not true that a 3 per cent. addition annually to the supply of gold would in fact have maintained prices on an even keel. Let us suppose the assumption to be true and examine the effects in such a case. In every year during the period of about sixty years the level of prices was the result of the operation of a number of factors, of which gold was one. The 3 per cent. gold line, which serves as a base, therefore allows for the influence of the remaining factors. We should thus expect to find that the two curves of prices and of relative gold were not merely geometrically similar but even identical. In other words, in so far

as there exists any dissimilarity between these two curves, the dissimilarity itself is due to the fact that there is an error in the estimate of the percentage addition that it was necessary to make annually to the existing supply in order to maintain the same price level. It seems to me that the Institute has begged the whole question at issue in the method adopted in the construction of the base line on which the whole of the analysis rests. The datum line is a derived statistical fact, and what is here derived is precisely what the statistical investigation should have set out to prove. And this derived statistical fact has been accepted from the Interim Report of the Gold Delegation.

7. If we examine the history of the period under consideration we find a strong presumption in favour of the statement that a higher percentage addition to gold was necessary in some decades than in others in order to maintain prices on an even keel. One of my colleagues has made some rough calculations in order to test the validity of that statement, and his figures suggest that in order to maintain a stable price level approximately 3 per cent. would have been required in the 'fifties and approximately 3·8 per cent. in the 'seventies of last century. In other words, the correct base line would have been not such a line as has been submitted by the Institute, but a sinuous line, and, if the curve of relative gold had been drawn in relation to that sinuous line, it would presumably have approximated more closely to the curve representing the actual trend of commodity prices. In other words, even if we admit that over a period of, say, twenty or forty years, the other influences upon price level cancel each other (though I would not, without evidence that has not been supplied, accept such a conclusion), is it not likely that over shorter periods—and periods not necessarily coinciding with cyclical fluctuations—some of these other influences predominate and should therefore be allowed for in the line of trend? In so far as they are not allowed to influence the line of trend they tend to destroy the value of those correlations relating to cyclical fluctuations which appear in the second part of the paper.

8. My point may be stated otherwise. The price level is determined by the supply of gold together with a combination of other factors. If the influence upon the price level of changes in the supplies of gold could be estimated, the residue could then be said to be due to the combination of other factors. Again, if the influence upon the price level of the combination of other factors could be discovered, the residue could be said to represent the influence of gold. The Institute assumes that it has followed the first method when (it seems to me) it has actually followed the second. The Institute has unconsciously assumed the influence of the combination of other factors in drawing the line of gold supplies which would produce a constant price level, with the result that if the calculation had been correct the line of relative gold supplies when related to the 3 per cent. line (straightened out and used as a base) would have produced the line of price trends.

9. It is not unlikely that I have misinterpreted this part of the paper and that it does not set out to prove that over a long period

gold is the only factor that influences the price level. If such is the case, that is, if it merely sets out to prove that there is a long-term connection between gold supplies and prices, I can but repeat that it does not seem to make a significant addition to our previous knowledge. Moreover, my criticisms still seem to me relevant.

10. I would like to refer to one other point in the results presented by the authors in the first section of their paper. I have had a rough calculation made from which it would appear that (i) from 1850 to 1884 gold movements preceded price movements, and (ii) from 1884 to 1910 price movements preceded gold movements. The method employed was that of finding the centres of gravity of the two curves for the respective periods, and the curves subjected to such treatment were those in the form of the cubic parabola. If the result is correct the method seems worthy of application to the other curves; and if it holds good for all curves it raises a point worthy of further investigation.

B.

1. The second section deals with cyclical fluctuations in gold supplies, prices and unemployment. I assume once more that the type of mathematical analysis employed is justified—for example, that the correlation of deviations from the parabolic curve may give a coefficient which, if significant, is of real statistical value. I confine myself mainly to a discussion of the reliability of the data and the economic significance of the results of correlation.

2. The Sauerbeck index-number seems to be unsuitable for the purpose of the investigation. Its use gives a result which might be true for Great Britain but false for other countries. I have had a price chart drawn (from 1860) for Great Britain, the U.S.A. and Germany. The differences in the movements seem to be sufficient to throw doubt upon the significance of the correlation coefficients indicated in the paper. If German or American prices had been taken as data they would probably have given different correlation coefficients and revealed different time lags.

The risk of error involved in the use of the selected unemployment index is even greater than that involved in the use of Sauerbeck's index-number of prices. For the earlier period the former is an index based upon the voluntary returns of a restricted group of trade unions, and is not reliable as an index of annual changes in the total volume of unemployment. The investigation assumes that (*a*) unemployment is identical in time and volume in all countries, and (*b*) the published figure is representative each year for the whole of Great Britain. Neither of these assumptions seems to me justified.

3. For the purpose of determining which is the most significant of the correlation coefficients it seems to me insufficient to work out the direct and two-lagged coefficients. With such a restricted range of experiment a high coefficient might merely be accidental. Among so many disconnected experiments one would expect to find, even as a matter of chance, a few " significant " coefficients.

Again, time lags are assumed to be constant at all periods, although they may actually vary from year to year throughout the period. If the periods of upward and downward trends were separated and separately treated, each might produce higher correlation coefficients, but with different time lags.

4. For this reason I hesitate to accept the conclusions already reached in this section of the paper. But the section calls for further comment.

(*a*) No attempt has been made to justify the use of seven years as a unit for constructing a moving average. Some people would prefer nine years, others ten. The case for seven years does not appear strong, but in any case it would have been an advantage to have employed two or three units and to compare the results.

(*b*) The most significant correlation coefficients—indeed the only significant ones—" have been found between the annual deviations from the parabola containing a log function." But this curve, we are told in the first part of the paper, is the one least characteristic of the actual path of the data.

(*c*) We are told that " the annual deviations of the commodity price index are correlated with the annual deviations of unemployment in such a way that changes in unemployment preceded changes in the commodity price index " [3(*c*)]. Here is a case where the result has been materially influenced by the type of unemployment index used. It refers largely—probably mainly—to those industries which are most sensitive to cyclical changes and are usually more quickly influenced than the average of those industries the products of which are included in the price index. Elaborate mathematical analysis tells us less than that which was already known.

(*d*) The data have been correlated in three-year blocks. Presumably no single year appears in more than one block. If such is the case it would appear desirable to move the blocks so that each year appeared three times, that is, the experiment should be repeated twice, and the results in all three cases compared.

I have stated that the highest coefficients -the only really significant coefficients—are those calculated from the curve (the log parabola) least characteristic of the actual path of the data. That the lagged correlation, with gold preceding prices, should give the highest coefficient of any is to be expected. That it should have shown no result with the other curves is so surprising as to call for further investigation. It seems to me that the conclusion, " The short-term movements of the commodity price index were associated with the short-term movements of relative gold in such a way that there was a tendency for the movements in relative gold to precede movements in the commodity price index " [6(B)i], though justified on *a priori* grounds, does not follow from the results of the mathematical analysis.

5. I would like to add that I would reply with far greater confidence to one question submitted by the Institute than to the remainder. I refer to the question which appears in the summary, namely, whether this preliminary survey has been worth while. I do not believe that we should judge the value of the work of the Institute by the positive achievements in this particular case. If the Institute had done no more than focus the attention of people

upon the points that have been raised, and excited the interest of statisticians who otherwise might never have bothered about economic data of this character, I think we must say that the work would have been justified. But if the writers wish to ask whether they have succeeded in convincing every student of economics of the accuracy of the method of analysis and of the value of the positive results that they submit, then I am afraid that there is one student, at any rate, who is not wholly satisfied.

DR. WISHART said he made no apology for dealing with the mathematical methods, since that was prominently set out both in the title of the paper and elsewhere as one of the objects of the investigation. The mathematical methods were those appropriate to a changing series with time in which the several values might be assumed to be distributed independently and in similar distributions, but about a changing mean. To eliminate slow changes in the mean, residuals from smoothed values were correlated. Such slow changes were usually sufficiently represented by a polynomial whose degree was small compared to the number in the series. It was possible to calculate certain quantities, which he would call x_1, x_2, etc. and which were determinate functions of the linear, parabolic, cubic and other terms. It was found that if slow changes existed, the first few values of x would be abnormally great, and the remainder independently and normally distributed. The whole group of x's was heterogeneous, and the correlation of two such series would have no easy interpretation; its value might easily be governed by a few exceptional terms. If these few abnormally great x's were rejected, and account taken of the number of degrees of freedom used up in fitting, one would then be correlating homogeneous material, and the coefficient obtained would have the usual interpretation; furthermore, its precision could be determined accurately.

Different series did not in general require to be fitted to the same degree, but for correlation purposes all series should be fitted to the highest degree found necessary for any one, for essentially series of x's were now being correlated whose number was the number in the original series less the total number of constants fitted, and series should be equal in length for correlation purposes. In Dr. Wishart's opinion it was by no means necessary that the original series should first be adjusted to look the same graphically. Such methods were no substitute for the mathematical methods proper. He did not care for the term "geometric correlation"; in any case such series had become difficult of interpretation owing to the destruction of independence; nothing was more damaging to the mathematics, which was bad enough for simple series, although on the whole well understood, but would become shocking for entangled series, which should no longer be treated mathematically as simple.

Coming to the application of what was stated in the paper under discussion, Dr. Wishart said he was all for keeping a problem as simple as possible. So much had been done, so many tables and graphs had been presented, that he felt the issue had been not a little confused. Space could have been saved by the elimination of certain tables.

For instance, Tables 5 and 9, and 7 and 8, were practically duplicates of one another, and could well have been eliminated and the space used for a fuller exposition of the mathematical aspect of the problem. There was no evidence that the authors fitted by stages until they were satisfied, by the recognized criteria, that slow changes had been eliminated. That this was important was seen by the argument that significant correlations occurred when the series were fitted by a "log parabola," admitted to be a worse fit than the other curves tested. The value of the correlations of residuals from the log parabola was largely discounted by the fact that they only showed that the fit was bad, which the graphs had already told. They added nothing more. A statement was made in the paper that it was the view of several authorities that although imperfections in the data might conceal correlation, they could not create it. This was perfectly true, but the authors had interpreted this as meaning that correlations found to be significant showed a definite association between the factors examined. But in the case examined the authors had created a spurious correlation which told nothing more than that with this particular fitted curve slow changes had not been fully eliminated. A more extreme case of spurious correlation would arise in fitting a straight line to the two series of data, when a long sequence of pairs of points would tend to be above the line, followed by a sequence below the line; a high correlation would therefore be obtained, which would show nothing more than that the straight line did little in the way of removing the slow changes. He did not see what had been gained by the use of the log parabola. In his opinion it would have been better to have concentrated on the three series of primary data and investigated the mathematical aspect of the problem more closely; the only correlation he would accept tentatively would be that of price index and unemployment (— 0·558), and even here he would want to be satisfied that the slow changes had been wholly eliminated by the cubic, while he would reject the argument that changes in unemployment preceded those of the price index. The "lagged" coefficient was *lower*, though not significantly so, than the direct.

The authors had given the cubic data for price index and unemployment, and Dr. Wishart said he had had the same worked out for the primary series of the world's stock of gold; the result was a very good fit, and using this series correlations were obtained as follows:

Price Index and Gold: + 0·167 as against the author's + 0·274 for relative gold.

Unemployment and Gold: + 0·0166 as against the author's + 0·0126 for relative gold.

These showed that the change to relative gold had not sensibly altered the correlations, which seemed reasonable, since the compound interest law, if it existed, had been taken into account as part of the trend. For the gold series the x quantities (linear, parabolic and cubic terms) were 2418, 609 and 525, all large compared to the standard error 13 of the remainder. Further calculation showed that these by no means accounted for the whole of the trend, for even the sixth degree term was significant, and the standard error had been reduced at this point to 6·6. The investigation he had outlined would have reduced the results to three tables, three graphs and three correlation coefficients, but the mathematical basis of the work would have been much stronger, and the whole of the information which it was possible for the data to furnish would have been gained, and that without the danger of any spurious element arising to throw doubt upon the reality of the correlations determined.

Dr. Wishart hoped that nothing he had said would be taken as discouraging the application of mathematical methods to series of economic data; his thesis was rather that more and better mathematics should be so used, and that methods with a firm basis, and which had been known for ten years in the form in which he had outlined them, might well become the standard practice.

MR. NORMAN CRUMP said he was glad to have an opportunity to support the vote of thanks, as there was no doubt that the authors of the paper had done very valuable pioneer work. He did not propose to enter at length into the mathematical aspect of the paper, as that had already been done, but as one who had to consider these problems from the practical, almost City, point of view, the impression left upon him by the paper and discussion was as follows. He remembered that many years ago in ancient Greece there lived a man named Procrustes who owned a bed, and everyone who came to stay with him was either cut down or stretched out to fit the bed. In taking these various curves and trying to fit the data to them, he could not help feeling that both the paper and the discussion were concerned more with how far the data could be made to fit a particular bed, than with making the bed fit the data. Dr. Wishart and Mr. Yule were both content to get a fairly rough-and-ready fit, but Professor Jones preferred the full rigour of the technique and wanted to cut down to the last inch and stretch to the last centimetre. He himself wanted to approach the problem from the other end and see what it was that one would expect to find, and how far the results tallied with it.

With regard to the summary of conclusions on p. 240, taking first the long-term movements as regards the price index, and also the world's relative gold stocks, he was going to suggest, with certain reservations, that the correlation between the two had been generally accepted by responsible opinion for some time, and all the paper did was to produce some supporting evidence. But he was surprised by the statement that the long-term movement of the commodity price index had not, so far, been shown to have had any association with the long-term movement of unemployment.

Referring to conclusion B (1) on p. 241, Mr. Crump agreed with Professor Jones in emphasizing that while short-term movements of gold were among the factors having an intimate connection with short-term movements of commodity prices, there were many other factors. He was again much surprised at the conclusion that movements in unemployment tended to precede the movements in the commodity price index; he would have expected to see it the other way round, and the authors of the paper should be placed upon their guard here.

With reference to the conclusions drawn in (3) (*c*), " It is not to be assumed that the symmetrical movement found in the period 1850–1912, associated, apparently, with the discoveries of new goldfields, will repeat itself, nor is it to be assumed that it occurred in any period before that investigated. Indeed, inspection of the data of the antecedent period, say 1800–50, suggests that no such symmetrical movement did exist." That was very likely true, but, with regard to the future, Mr. Crump did not think one ought to rule out any possibility.

Referring to Clauses 3 (*e*) and 3 (*f*) on p. 242, here one was brought up not only against the fact that there were other factors besides gold which entered into the generally accepted theory of money, but also against the real object of the investigation, which he understood to be to find some foundation upon which one could work in assessing probable movements in the future, and in determining future monetary policy. It was rather doubtful how far the experience of pre-war years was of value in discussing post-war conditions. The clause began by saying, " If the pre-war working of the gold standard were restored." Mr. Crump had great doubts as to whether it ever could or would be restored, or indeed ought to be restored, and if that were so, much of the *raison d'être* of the paper went by the board. To-day the nation was on a paper currency, and there was no prospect of going back to the use of the gold sovereign as currency. Banking technique, both national and international, was developing every day. At home the Bill of Exchange had gone out of use; abroad there was the foundation of the Bank of International Settlements, and the present close connection between central banks. There were new methods of exchange dealing, closer contact, better communications, and a whole host of improvements in the working of the financial machine. On the other hand, Great Britain was no longer the chief industrial country of the world. The whole basis of the position was quite different, and would remain quite different, from that of the period covered by the paper.

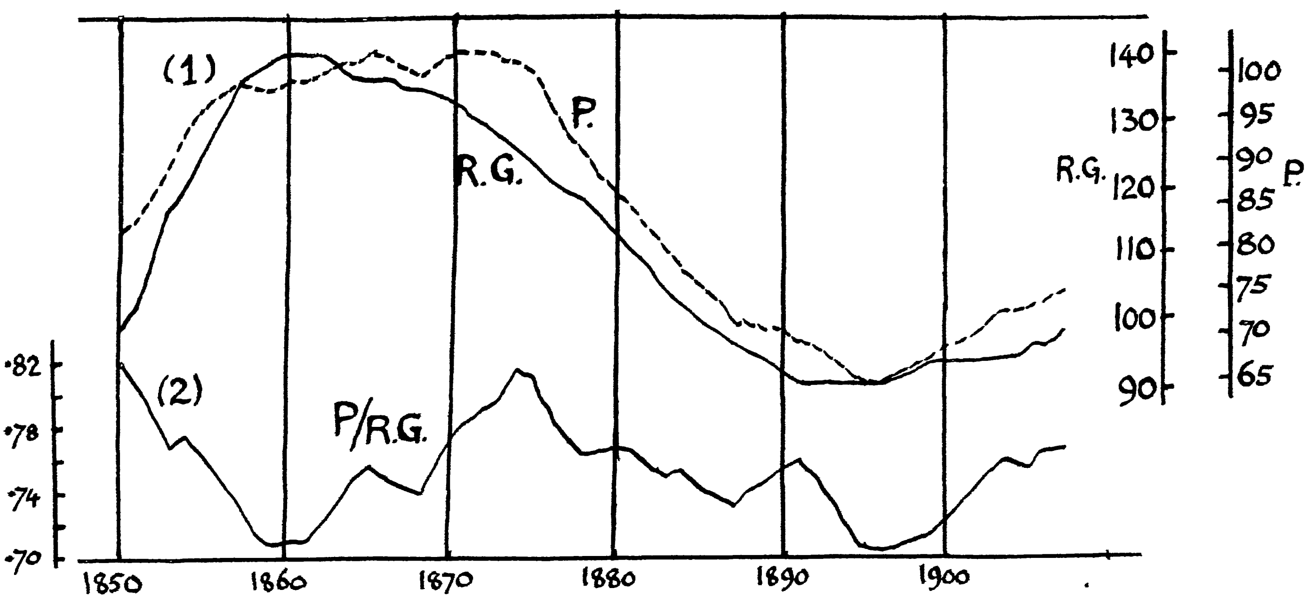
Mr. Crump suggested that if the authors intended the paper to be an historical investigation to serve as a basis for future investigations as to what was likely to happen and what ought to be done, they were building upon a foundation of sand. He did not want it to be thought that he was ruling out the value of historical experience, but he suggested that historical investigation was only the beginning of the task, and even when that was done to their own and other people's satisfaction, it would be necessary to sit down and see how these arguments should be modified in order to fit the vastly different conditions of to-day. He was bound to confess that to a certain extent the paper was only establishing self-evident facts, and in any case, when this phase of the work was completed, it was only the initial stage of the task envisaged by the Institute.

Dr. Rhodes said he wished to support the vote of thanks to the writers of the paper; he had a great deal of sympathy with them in their efforts. The kind of difficulties which were to be overcome in dealing with this sort of problem were to a great extent methodological difficulties. In the case of the figures of prices, for instance, there was obviously a secular change, and at the same time, superimposed upon that, there were certain haphazard changes, certain cyclical changes, and so on. One of the main difficulties in dealing with these problems of relating time series to one another was, as pointed out by Dr. Wishart, the elimination of fluctuations and getting at the real trend figures. Unfortunately, in practice, as it was not known how much of a given yearly figure was trend and how much fluctuation, the result was bound to be approximate. In judging of the usefulness of a particular method from the results, it was possible to decide whether a method had succeeded or not if it appeared reasonably well to have smoothed out the fluctuations which existed. Certain of the methods applied in this particular case did not seem to have succeeded in their objects, and fluctuations had not been smoothed out. For instance, in Chart X, Graph 18, there was a smoothing method resulting in a curve which certainly did not smooth out fluctuations. On the other hand, the average method used in Chart V, Graph 9, had succeeded reasonably well in smoothing out the fluctuations.

The kind of problem which had to be considered when this smoothing method had been finished was to relate the secular trend of one series to the secular trend of another, to relate fluctuations of short-term movements in one series to short-term movements in another series, remembering all the time that one is no longer dealing with exact figures, but only approximations. Dr. Rhodes felt that a good deal of this paper dealt with something that did not exist. As far as he could see, no short-term movement existed in the curve of relative gold (Chart VII, Graph 2). Statisticians were very pleased to see a curve of this kind; there did not appear to be any short-term fluctuations in it and a good deal of time had been wasted by imposing on that curve short-time fluctuations, by assuming a secular trend different from the trend obviously exposed in the graph.

He considered that the kind of thing the authors should do in dealing with this problem would be to relate the long-term movement in the relative gold figures to the long-term movement in prices. The short-term movement in prices, which was cyclical in character, could not be related to any short-term movement in relative gold because that movement did not appear to exist, but could be considered in relation to the fluctuations in unemployment.

When it was a question of relating the secular trends to one another, Dr. Rhodes would have thought that some such process as Mr. Yule had suggested would have been the simplest thing to do—to put one curve on the same graph as the other curve, with proper choice of scales, and to notice how much the parallelism was a true parallelism, and how far there was divergence from it. (See Graph (1) p. 204.) When that was done it would be seen that the price curve appeared to precede the gold curve up to about 1860, but from 1860 the gold curve decreased, whereas the price curve was more or less stationary. It began to decrease after 1870, and about 1890 or 1895



(1) R.G. .—Relative Gold. Figures from Table 6
P. :—7-Year Moving Average of Sauerbeck's Price Index (1867–77 = 100). Table 4.
(2) P R.G. :—Ratios of Series above.

the two increased again, only the price curve increased at a quicker rate than the gold curve. He did not say that that kind of similarity of movement could not exist and be due to the action of a great many causes all operating at the same time, but he would say that there were probably particular causes operating over a particular series of years, and other causes predominating over other years, and this sometimes preceding and sometimes lagging of prices and relative gold was consistent with the knowledge one had of the history of the past fifty or sixty years. He would also have thought it reasonable, based on the ideas one held as to why prices were at particular levels, that some knowledge should be gained from these figures by taking relationships between prices and relative gold, and noting the changes that had taken place over this period in the structure of credit built on gold and of actual gold money. (See Graph (2) p. 204.) He would not like to give an opinion on monetary theory, but from the statistical point of view, when one plotted the figures showing changes in the ratio of prices to relative gold, it was obvious that there were questions which arose as to what happened in a particular year—such as 1860—which made a break in the curve; what happened in 1873, which made another break, or in 1895? Those were the lines on which he would have thought that the paper should proceed, and on those lines these elaborate mathematical processes were quite unnecessary.

Dr. Isserlis said he had been feeling in the course of the discussion that his mathematical colleagues had perhaps been a little too diffident; that there were occasions when it was better to be perfectly outspoken, even if feelings were a little hurt. Dr. Rhodes had referred to a certain amount of mathematics as having perhaps been more than sufficient, but Dr. Isserlis was going to say quite plainly that in what was the subject-matter of the paper the mathematical theory as it stood to-day was complete and available in papers which were within the reach of everyone, and, as Dr. Wishart had suggested, had even filtered down, during the last ten years, into the text-books. Five or six years ago Mr. Yule in his Presidential Address explained quite clearly why the methods used in the present paper were likely to lead to nonsense correlations. That was one important step in bringing the mathematical theory clearly before the economics and general statistics public. He had shown that nonsense correlations could be expected and he had indicated why they could be expected. A series of papers had been written on the subject, dating from the comparatively ancient one by Hooker in the *Journal* of the Royal Statistical Society; there were papers by Pearson, Anderson and others, which had made the mathematical theory quite clear. When one had a time series it was possible by simple methods to discover whether a permanent trend could be eliminated, and whether when that trend had been eliminated the residuals that were left possessed a certain amount of stability. The first part could be done by easy arithmetical methods, because the taking of a five, seven or nine years moving average was simpler than the fitting of cubic and logarithmic parabolas, and was more effective in the elimination of the permanent trend. When that permanent trend had been eliminated one dealt with successive differences. When one came to differences of the first, second or third order and calculated the standard deviations of those series, there would at first be considerable variation from one result. Next, if those residuals possessed a certain stability, these standard deviations would tend to become equal to one another. The theory was difficult to prove but easy to apply. Formulæ existed by which it was possible to decide whether the apparent stability of these standard deviations, after proceeding to the fifth or sixth or higher order differences, was genuine or not. If not, the problem should be given up.

Dr. Isserlis said he proposed to send references to the *Journal* of papers that ought to be studied by people undertaking similar investigations. In the case of two time series, in exactly the same way it was possible to find correlations between the second and third or higher differences; they might differ considerably, but after a time they might become stable. If they did become stable there was the answer to Mr. Yule's question, and one would know they were not nonsense correlations.

Dr. Isserlis said he did not propose to step into what was not his domain, and therefore he would not say anything about the suitability of the economic data; it might be that the data were properly chosen and that if correct mathematical methods had been employed, definite results would have been obtained—either that there was no correlation in the fluctuations about the general trend or that certain correlations existed.

Dr. Isserlis intended the remarks he made to be supplementary to those of Mr. Yule, who was dealing with the general trend of the two curves, and who had pointed out that the similarity could be examined quite simply by putting the two curves together. He was speaking now about the alleged correlation between the short-term fluctuations in the two series.

Dr. Isserlis suggested that the so-called mathematical analysis in the paper was hardly worth the paper that it had been printed upon; that this was not because mathematical analysis had not reached the stage at which it could be easily and usefully applied, but because the mathematical methods that had been described and were generally available had not come to the knowledge of the authors. He hoped that this was the explanation, because he could not understand the position at all if the methods were within their knowledge and if they definitely chose to neglect them.

Professor Greenwood did not wish to add anything beyond saying that he entirely agreed with what his predecessors had said. There was some analogy between the circumstances of this meeting and those which would exist if he (Professor Greenwood) were to read before the Classical Association an ambitious paper on a question of Greek philology, the paper containing unequivocal evidence that he had not mastered the elements of Greek grammar. The criticisms his colleagues had given were of elementary errors such as were, or might be, made by first-year students. The question was not one of difficult technicalities upon which experts might differ in opinion, but of simple errors which teachers of statistical methods warned their students against. The fact, or alleged fact, that the data were intrinsically interesting was not relevant to this issue.

MR. HAWTREY thought the statistical experts had been almost excessively severe upon the methods pursued in the paper, and he felt it would be a mistake to say that the results were completely invalidated by the methods adopted.

To take, first of all, the question of nonsense correlations, he did not suppose Mr. Yule would have suggested that there could be nonsense correlations with regard to the short-term trends; they could only arise in regard to the long-term trend. He did not think the correlation sought to be established of the long-term trend was one of the main parts of the conclusions of the paper; as he understood it, the attempt was made to discover a trend chiefly in order to measure the short-time variation against it. At any rate, it had been done sufficiently well to produce some results with regard to the short-term trend.

Mr. Hawtrey said he had two observations to make with regard to the short-term movements; one was that though it was true that there were no significant year-to-year short-term movements of relative gold, he did not think it was true to say the three-year periods were entirely without significance. The correlations established were only of rather a shadowy character with regard to the short-term movements of gold, but it was not quite destitute of interest that some correlation should have been suggested.

It had been pointed out quite emphatically in the paper itself that gold was not by itself an adequate measure of money. In 1850 there must have been three or four times as much silver money in the world as gold. About 1872, the turning-point in the long-term curve, a prolonged period of wars had created an enormous amount of paper money, which was gradually eliminated afterwards. Undoubtedly there were very big disturbing factors affecting these results. On the top of gold there was a mass of money not proportional to the gold, on the top of the money a mass of credit not proportional to the money, and on the top of the credit a mass of incomes not proportional to the credit. That accounted for the fact that the correlations arrived at were of a shadowy character.

With regard to the correlation between unemployment and the price level, Mr. Crump expressed surprise that movements in unemployment should precede movements in the price level. He (the speaker) was not surprised; and he thought it was a blemish in present-day monetary theory that too much emphasis was laid on the price level as the criterion of the monetary situation existing at any particular time. He would prefer to say that the true foundation of the monetary situation was to be found in the aggregate of incomes, and that variations in employment and in prices *followed* variations in incomes. There was no necessary presumption that variations in prices should occur earlier than variations in employment. Mr. Hawtrey thought there was some real significance in the result disclosed as to the correlation between unemployment and the price level, as it was the change in unemployment that preceded the change in the price level. He would not take this investigation as conclusive on the subject, but he thought it was a case in which the theory was not at all inconsistent with the results arrived at, and for that reason it appealed to him.

Whatever the defects of the paper from the point of view of mathematical analysis, they should be most grateful to this most industrious of Industrial Institutes for providing a great mass of material for the Society to get its teeth into and to draw inferences from, and for statistical experts to improve upon.

SIR JOSIAH STAMP said he had no doubt that Mr. Wyld would want to consider the criticisms made and to reply at leisure in the *Journal*, but before asking him to reply briefly, there were one or two considerations to which he would like to refer, and also questions which arose in the mind of any economist desirous of using mathematical methods. The economist wanted guidance as to the statistical methods that were appropriate for certain economic data, not to be warned off all of them. He was prepared to go to some trouble to learn to use them properly, even if he could not formulate them or their limits. The economists were prepared to learn to play the tune on the piano, but were not sufficiently skilled to do so on the violin. If such enquiries were reserved to the mathematicians, he might be limited in his use of the data.

He noticed a more commendable freedom in the paper from the use of the word " cause " than in the discussion. The paper had not fallen into that particular difficulty or error of referring to " causes " when figure relations existed. If there was one thing the paper suggested more than another it was the desirability of forcing home upon economic and statistical thinkers the fact that cause did not necessarily show itself as prior in point of time to effect. This might be true, first because what was called " cause " was only another kind of result of some hidden cause of both, or something only ascertainable objectively and registered at a later date. There might be various correlations with the bank rate, and it might be that the causes giving rise to the change were prior to the effect; there might be all kinds of reasons why the objective indications of cause came after those of effect.

He agreed with Mr. Hawtrey that when one found elaborate and possibly false statistical methods applied, producing such a series of interesting economic results, it gave one cause to wonder whether all the vices of method had been enough to destroy the value of the paper.

The question he would like to ask the critics was, Given that a particular correlation efficient had a large element of nonsense or was full of vice, did it follow that when one had used the same trend and worked out the several correlations of different lags, that the precedence of these correlations had no meaning? Did it follow that if one had a *constant* degree of vice or nonsense, that the order of co-efficients for lag had no significance at all? The reason he asked these questions was because it was rather extraordinary that the correlations shown under different methods as between prices and gold should answer best to a particular lag throughout, which on a deep analysis from an economic point of view might seem to have a genuine reason.

In regard to unemployment and prices the paper threw out a very important challenge to the modern French school upon this particular point. If there had not been so many mathematicians to tell them that all the method behind this was invalid, the economists might be having quite an interesting time discussing these economic results.

Had the results been cooked? He thought they might be absolved from this charge, but the authors, having ranged over all kinds of tools, had not apparently used the right ones. When one went to the statistician and asked for new tools, would the reply be that the correlation coefficient for deviations from any such trends had doubtful validity in the field of time series? Were they still to go on hoping that something would emerge that could be used?

Sir Josiah Stamp said he was the first to use the method of coefficients of deviation from the straight line trend by least squares for such economic data, in 1918 in a paper read before the Society, and he did so before having any knowledge of nonsense correlations, but in the best light of all the teaching he could get of the things to watch under the guidance of Warren Persons. He had done his best to play with one finger on the piano. Did the paper mean they were to be completely agnostic on the use of this method in the field of statistical science?

On this question of cause and effect in prices, one would be prepared to put up quite a decent argument that it was not so much the quantity of relative gold affecting price, as that the price level affected the relative gold! For the intensity of mining production is influenced by the value of the product. It was best to avoid the terms of " cause and effect " and to establish statistical correlations.

Sir Josiah said he would differ fundamentally from what Mr. Crump had said. The very fact that it had been discovered how the future would behave meant that the future could be prevented from behaving in that way. The more such results were used for forecasting the more would be destroyed the random and non-human character of the figures.

He would say that the work of the Industrial Institute, while a good deal of it might be misconceived, had been worth while. One could find fault with particular methods and they might be elementary or wrong, but the very fact that particular types of people were directing attention to particular types of analysis had done good.

The following contributions to the discussion were received in writing after the meeting :—

MR. MACROSTY : The general price level of commodities expresses the relation between the quantity of commodities exchanged, on the one hand, and, on the other, the stock of purchasing media and their velocity of circulation. Among commodities we have goods sold at retail, goods sold at wholesale, securities, and real estate; for each of these there is, or may be, an appropriate price index. Among purchasing media we have, in this country, a moderate quantity of gold or notes backed by gold, a fiduciary issue of notes, a much larger quantity of bank credit (cheque-drawing accounts), and an unknown quantity of consumers credit in the shape of "book credit" or the popular but dangerous instalment purchase system. The velocity of circulation is not simple but complex and in no form is it known. Out of this indeterminate equation the authors of the paper have taken one element on each side and have attempted to relate changes in wholesale prices to changes in the supply of monetary gold. The suppressed premiss is that all the other factors cancel out continuously over a long period of years—an unthinkable hypothesis. We know that the Bank of England can expand or contract bank cash and, therefore, credit, without reference to gold, and when the London joint stock banks reduced the ratio of their cash to deposits from 14·3 per cent. in 1919 to 11·2 per cent. in 1920, it is easy to associate that change with the rise in wholesale prices in those years. The whole problem appears to me to have been misconceived. A book credit gives its holder the same power to raise prices as an overdraft.

Secondly, the data used appear to me insufficient to bear the operations to which they have been subjected. The stock of monetary gold in 1850 is assumed as accurately known, whereas it is only an approximation, since the ancient acquisition by the Spanish of American temple treasure is omitted, the melting down of currency for industrial purposes is ignored, and an empirical rate of wastage has been taken. It has been further assumed that the demand for gold in 1850–1912 was normal, whereas it was highly abnormal. In 1850 practically only Britain was on a gold basis, and in the course of the next sixty years the other industrial nations passed from silver to gold. Industry also expanded enormously over the period, and with that development came also a great expansion in the use of credit instruments. In such circumstances the 3·1 per cent. calculated necessary annual increase of gold is a mere arithmetical curiosity with no economic bearing.

The attempt to check the results by analysing the long-term movement of unemployment (as a measure of industrial development) also fails from the extreme imperfection of the trade union figures used and from neglect of the obvious truth that, through changes in technique and organization, production can increase while at the same time employment decreases.

The paper has been attacked by the mathematicians; I submit that it is even more vulnerable from the standpoint of the economist, and I regret that so much labour should have been spent to produce results that are valueless.

DR. D. JONES: I should like to comment on two points of technique.

1. In Chart III, Graphs 6 and 7, the Industrial Institute have

fitted straight lines and cubic parabolas to data of the annual rate of change of the World's Stock of Gold Money and the annual rate of change of Sauerbeck's Commodity Price Index, and note that the straight line and curve for money cut each other six (? five) years earlier than do the straight lines and curve for the price index, from which they make the inference that movements of price are lagged behind those of gold. But clearly in so far as the cubic parabolas fit the data well, the straight lines fail to do so. What ascertainable significance have the points where curves representing relatively good and relatively bad fits cross one another? There might conceivably be a case for measuring the period between the dates when the two parabolas reach their minima and then begin to move upward, but this is another matter and, as might be expected, gives a different result.

2. The Institute have worked out a series of lagged correlation coefficients between gold and prices and suggest that they indicate a tendency for short-term movements in gold to precede those of prices, but this appears to be true only of the coefficients calculated from the parabola containing a log function. The coefficients calculated from three other trends indicate the opposite tendency. Moreover, the relatively great magnitude of the coefficients calculated from the parabola containing a log function arise, as the Institute themselves tentatively admit, because the curve "excludes the minor annual deviations"—in other words, because the log curves do not fit the data well. And what the correlation coefficients really measure is the extent of failure to fit. Further, if we substitute for the correlation coefficients, coefficients of determination in order to obtain an index of the degree to which the variance of one factor may be ascribed to the other, it will be seen that the assertion that gold movements tend to precede price movements really rests on one set of correlation coefficients alone, out of the eight calculated, viz. those calculated from the parabola containing a log function, with the data arranged in *three-year blocks*. The coefficients of determination for deviations of the *annual* data calculated from this type of curve are—

(*a*) Direct, +·403.

(*b*) Lagged, when the price index is made to precede, +·203.

(*c*) Lagged, when relative gold is made to precede, +·272, and it is impossible to accept the coefficient of +·272 as the basis of an argument while ignoring the coefficient +·203.

MR. CONNOR: Correlation of time series involves statistical problems of a complicated and elusive nature whose implications still form the subject of controversy. It is agreed on all sides that analysis should involve the separation of evolutionary, quasi-periodic and current movements, but how is it to be decided whether the separation has been satisfactorily effected? Unfortunately there is no single comprehensive source of information on the subject, and the investigator who relies upon the cursory treatment given in the standard text-books may go far astray before he realizes that any special difficulties exist.

Some authorities consider correlation of time series is only a special case of multiple correlation with non-linear regression, involving time as one of the independent variables. Upon this hypothesis the series under investigation may be decomposed into their elements in a systematic manner, and the effectiveness of the decomposition measured by suitable tests. The correlation of the residuals will thus yield a figure possessing a definite probability significance. It should, of course, be realized that these tests are purely formal, and must be supplemented by substantial tests depending upon non-statistical considerations. This method has proved fruitful in the biological field, and its validity in the economic field is a question of fact depending on whether the series under consideration can suitably be described by means of simple mathematical curves.

Others, while believing that the course of economic phenomena involves sufficient regularity to justify mathematical analysis, nevertheless consider that the process is unnecessarily empirical. Upon this basis the correlation co-efficient would be a useful descriptive device, but would have no logical application outside the area of the particular experiment under consideration. Two correlation co-efficients could not be compared, and tests of significance would be meaningless in the probability sense.

Others, again, believe that the factors involved in economic series are so irregular and equivocal as to defy mathematical analysis. In their opinion a far better judgment can be formed by appeal to the human eye than by mechanical methods.

All parties are agreed that a high correlation coefficient does not prove causation, and that in the world of human activities where evolutionary movements are relatively speedy, there is peculiar danger of obtaining nonsense correlations.

The Industrial Institute do not define their attitude towards the general problem involved, nor do they appear to think such definition necessary. They show complete indifference to modern technique. Tests of significance are employed without critical examination of their applicability to the methods and matter under investigation. In Science, as in Law, there is a doctrine of *Election*. One is not allowed to approbate and reprobate, to take the benefits of a theory whilst escaping the liabilities that theory imposes.

On the other hand, mathematical statisticians at home and abroad are not free from blame. Their researches drag along slowly and co-operation and agreement are sadly lacking. In the circumstances it is hardly surprising that the text-books are, and remain, out of date, and that investigators complain that they have been misled.

MR. PERCY WALLIS: In the discussion of nonsense correlation the major issue in the Institute's paper was overlooked. The data examined are so unsatisfactory that the result must be unsatisfactory. The stock of gold money is only a rough estimate. Relative gold is based on the unsupported assumption that 3·1 per cent. is a constant factor. The seven-years moving average is a further doubtful assumption. Then the movement of price is measured by the Sauerbeck index-number. This index-number is the average movement of wholesale prices, which may be quite different from the actual *price* movement.

The quantity of gold must first act on the final purchase or retail price, which makes wholesale prices unsatisfactory as a criterion. Finally, as pointed out by Mr. Hawtrey, movements of prices may not conform to the movement of incomes. It is quite possible the quantity of money has more influence on incomes than on commodities which are subject to changes in cost.

From 1850 to 1912 the index-number of prices shows a rise of 10 per cent. Incomes during this period show a rise of about 180 per cent. Miners' wages in France increased from £21 4*s.* to £60 4*s.* Incomes in many countries increased in similar proportions, but records do not cover the whole of this period. Very few complete series are available. It is therefore probable that an enquiry into the movement of incomes derived from gold-mining would give a more definite clue to price movements. If this is the case, the connection between the quantity of gold money and the price level is nonsense whether correlated or not.

IN reply to the criticism of the paper Mr. Norman Wyld, Director of the Industrial Institute, writes as follows :—

I wish, speaking for the Committee of the Industrial Institute, to express our appreciation of the action of the Council of the Royal Statistical Society in affording us this opportunity for discussing some of the statistical work in which we have been interested for some time, and to thank those members of this Society who have been at pains to look at, and give us their views on, the paper submitted to them.

I have also to offer, on behalf of those who did the work, summarized in the paper, their reply to particular criticisms made.

1. *General.*

It would appear that we have failed to make clear the basis of the argument contained in the paper. The general ideas behind the criticism seem to be : -

> The mathematical theory which should have been used in the paper is complete, and the methods and tests to be used in such analytical work as we attempted have been defined.
>
> The paper does not make use of those methods and tests.
>
> The results are, therefore, valueless.

In corresponding general terms our reply is :—

> The extent of the agreement as to the methodology of the analysis of time series is over-estimated by the critics.
>
> The paper uses methods and tests other than those suggested by the critics.
>
> The paper was put forward as an incomplete, experimental and preliminary survey, intended to illustrate the use of methods and criteria not in general use, and designed to test certain hypotheses. The results are on the whole self-consistent.

The extent to which the authority of those disposed to accept the methods used in our work outweighs that of those who have expressed a contrary view is, perhaps, a matter of opinion. In view of the practical importance of the issues involved it is fortunate that there is another more definite test, namely, the extent to which our results can be used in forecasting events.

I may cite, in illustration, we have it on record that in March, 1931, we forecasted that "the commodity price level is more likely to fall a further ten points, during the next six months or so, than, as most appear to think, to begin to rise from the present level." The calculation was made early in January, 1931, and was based on the *Statist* figure for the last quarter of 1930 namely, 88·6. The figure for August, 1931, given by the *Statist*, September 19, was 79·1. Thus the actual fall amounted to 9·5 points in the eight months from the December level against our forecast of ten points in "six months or so."

In making this forecast we made use of the figure for relative gold for 1930, the direct correlation coefficient + 0·937 between relative gold and the commodity price-index, together with the lag of prices in respect to gold indicated by our analysis by means of the parabola containing a log term.

2. *Replies to detailed comments.*

(a) *The suggestion that the methodology of the analysis of time series is complete.*

In support of our view as to the present position of the science and art of statistical analysis many authorities might be cited, *e.g.* Professor Irving Fisher, *The Theory of Interest*, 1930, pp. 431–2 :—

> "The general methodology of analysis of time series is still in the process of formulation. The specific problem of trend analysis is still largely unsolved. . . . It is like giving the play of *Hamlet* without Hamlet to eliminate the secular trends of "*i*" (interest rates) and "*P*" (prices) "from a study of long-term relationships in which those very secular trends are most important and often dominant influences."

Again, Professor Warren M. Persons, in a chapter of the *Handbook of Mathematical Statistics*, edited by H. L. Rietz, 1924, p. 165, writes that :—

> "The most satisfactory method of setting forth the relationships between time series of economic statistics is, first, to compute and compare their respective indexes of seasonal variation; second, to compute and compare their lines or curves of secular trend; and, third, to correct the original items for seasonal variation and secular trend, and compare the resulting graphs. Coefficients of correlation for the various possible pairs of items of time series are useful mainly as a basis for judging the lag of one series with respect to another."

As we were concerned with annual data the reference to seasonal variation does not apply. Our chief concern is to compare the curves of the secular trend and to compute the correlation coefficients of the deviations from these curves.

(b) *The suggestion that we have not used the current technique of smoothing.*

An essential characteristic of our work is that we have made an attempt at trend analysis, and for that purpose have not made use of the numerous statistical methods for smoothing data which have been introduced of recent years. The reason for not using those methods is that they give results which differ from each other, whereas the method we have used, namely, that of Least Squares fitted by moments, gives the same curve as does the polynomial method. See, for the method of fitting by polynomials, Dr. R. A. Fisher's *Statistical Methods for Research Workers*, 1928, pp. 124-31, and for the method of fitting by moments, D. Brunt's *The Combination of Observations*, 1923, pp. 126-7.

Thus, the differences which make up the polynomial ordinates of the 3rd degree for the data of the commodity price-index, given in Table 15, are :—

$$Y_1 = 30{\cdot}254634 + 80, \quad \Delta Y_1 = -\,11{\cdot}598618,$$
$$\Delta^2 Y_1 = 3{\cdot}663053, \quad \Delta^3 Y_1 = -\,0{\cdot}410443.$$

These polynomial values give the same ordinates as those obtained by the cubic parabola.

The object of fitting the cubic parabola to the relative gold and the commodity price-index was to determine the lagged correlation between the *annual deviations* in each series. Since the correlation from that base was found to be insignificant there was no necessity to go beyond the cubic parabola.

To test these conclusions, we have correlated the data for relative gold and the commodity price-index given in Tables 14 and 15, from the base of the 7th degree polynomial. The result was the same as that obtained from the cubic parabola, *i.e.* no significant correlation.

The 7th degree polynomial values are : —

Data for relative gold, Table 14.

$Y_1 = 21{\cdot}019889 + 80$, $\Delta Y_1 = -\,1{\cdot}752736$, $\Delta^2 Y_1 = -\,0{\cdot}368551$, $\Delta^3 Y_1 = 0{\cdot}004369$, $\Delta^4 Y_1 = 0{\cdot}581345$, $\Delta^5 Y_1 = -\,0{\cdot}435625$, $\Delta^6 Y_1 = 0{\cdot}155183$, $\Delta^7 Y_1 = -\,0{\cdot}025479$.

Data for commodity price-index, Table 15.

$Y_1 = 26{\cdot}202146 + 80$, $\Delta Y_1 = -\,8{\cdot}844570$, $\Delta^2 Y_1 = 5{\cdot}807506$, $\Delta^3 Y_1 = -\,5{\cdot}478996$, $\Delta^4 Y_1 = 4{\cdot}482350$, $\Delta^5 Y_1 = -\,2{\cdot}372733$, $\Delta^6 Y_1 = 0{\cdot}758543$, $\Delta^7 Y_1 = -\,0{\cdot}116324$.

(c) *The suggestion that the mathematical apparatus of the paper is unnecessary to establish the apparent relation between a long-period movement in the world's stock of monetary gold and British wholesale prices.*

The critic who raised this point suggested that "All that is needed is to bring the graphs together. . . ." On the other hand, Dr. R. A. Fisher, *op. cit.*, p. 25, states that,

> "Diagrams prove nothing, but bring outstanding features readily to the eye. They are therefore no substitute for such critical tests as may be applied to the data. . . ."

To illustrate the tests supplied by the mathematical apparatus used, the results of which meet the criterion of "the geometry of curved surfaces," we give the following examples taken from the $y =$ Sin θ curves applied to the data of relative gold and the commodity price-index arranged in three-year blocks, see Chart XI, Graphs 21 and 22.

	The $y = a + bx + cx^2 + d \log x$ ordinates derived from the $y =$ Sin θ ordinates of relative gold arranged in three-year blocks.		The 3rd degree polynomial ordinates derived from the $y =$ Sin θ ordinates of the commodity price-index arranged in three-year blocks.	
Three-year intervals.	(1) Ordinates of $y =$ Sin θ applied to relative gold.	(2) Ordinates of $y = a + bx + cx^2 + d \log x$, derived from the ordinates of $y =$ Sin θ, col. 1.	(3) Ordinates of $y =$ Sin θ applied to the commodity price-index.	(4) Ordinates of the 3rd degree polynomial derived from the ordinates of $y =$ Sin θ, col. 3.
1850–52	111·44	101·22	109·29	106·24
53–55	119·38	129·36	117·20	118·56
56–58	126·54	137·94	124·33	127·09
59–61	132·22	139·18	130·00	132·25
62–64	135 86	136·92	133·64	134·45
65–67	137·12	132·85	134·89	134·13
68–70	135·86	127·90	133·64	131·69
71–73	132·22	122·60	130·00	127·56
74–76	126·54	117·31	124·34	122·17
77–79	119·38	112·26	117·20	115·94
80–82	111·44	107·63	109·29	109·29
83–85	103·51	103·53	101·37	102·63
86–88	96·35	100·08	94·24	96·40
89–91	90·67	97·33	88·57	91·01
92–94	87·03	95·36	84·94	86·88
95–97	85·77	94·20	83·68	84·45
98–00	87·03	93·90	84·94	84·12
1901–03	90·67	94·49	88·57	86·32
04–06	96·35	95·99	94·24	91·48
07–09	103·51	98·43	101·37	100·01
10–12	111·44	101·84	109·29	112·34

Equation for ordinates in column 2 :—

$$y = 124{\cdot}95252 - 23{\cdot}413660x + 0{\cdot}569110x^2 + 165{\cdot}691208 \log x.$$

Differences for polynomial ordinates in column 4 :—

$$Y_1 = 32{\cdot}337877 + 80, \quad \Delta Y_1 = -12{\cdot}327606,$$
$$\Delta^2 Y_1 = 3{\cdot}796553, \qquad \Delta^3 Y_1 = -0{\cdot}421837.$$

The ordinates in column 2, that is the ordinates of the log parabola which has been derived from the $y = \text{Sin}\ \theta$ ordinates, approximate very closely to those of the log parabola derived from the actual data of relative gold. See Table 17.

That is to say, the $y = \text{Sin}\ \theta$ curve not only " fits " the data, but its ordinates may be used instead of the actual data for calculating the ordinates of the log parabola.

Similarly, the ordinates in column 4, that is the ordinates of the 3rd degree polynomial which has been derived from the $y = \text{Sin}\ \theta$ ordinates, approximate very closely to those of the cubic parabola derived from the actual data of the commodity price-index. See Table 14.

That is to say, the $y = \text{Sin}\ \theta$ curve not only " fits " the data, but its ordinates may be used instead of the actual data for calculating the ordinates of the cubic parabola.

The above two calculations mean that the $y = \text{Sin}\ \theta$ curve applied to the actual data describes almost exactly the long-term movement both of relative gold and of the commodity price-index.

The characteristics of each series of data, with respect to the distribution of those data about their respective arithmetic means, which coincide with the long-term movement of $y = \text{Sin}\ \theta$, are shown in Chart V, Graph 10 and in Chart VII, Graph 13. See also Note B of the Appendix, Clauses 7 and 8.

The above " measure-determinations " make it quite clear that the data of relative gold and the commodity price-index did move along a long-term path which can be described by the simple harmonic $y = \text{Sin}\ \theta$.

It may be stated that the equation $y = a + bx + cx^2 + d \log x$, derived from the $y = \text{Sin}\ \theta$ ordinates of the commodity price-index, also gives a very close approximation to the ordinates derived by the same equation from the actual data, the difference is within 2 per cent. The constants of the equation from the $y = a + bx + cx^2 + d \log x$ ordinates derived from the $y = \text{Sin}\ \theta$ ordinates of the commodity price-index are : –

$$y = 121{\cdot}904809 - 23{\cdot}376496x + 0{\cdot}567486x^2 + 165{\cdot}212294 \log x.$$

The above is an illustration of the essentials of the methods of analysis used in this paper. It is a method the significance of which has not, in our view, been fully appreciated by our critics. The gist of the matter is that our aim in the analysis of time series is, always, to find some mathematical " scheme " with which the data may be replaced. The above is part of such a scheme. When the data have been replaced by such a scheme, this scheme may be dealt with in terms of purely mathematical considerations, as distinct from considerations merely associated with the data.

It is evident that such a process differs from that which our first critic suggests in his comment that " All that is needed is to bring the two graphs together. . . ." See his figure A.

(d) *The suggestion that our correlations may be nonsense correlations.*

One critic suggests that our interpretation of the parallelism between relative gold and the commodity price-index is not justified. We described it as "geometric" correlation. The critic argues that the parallelism may be fortuitous. He cites in illustration the parallelism of certain Marriages and Deaths. He assumes that these are not associated although he has found a correlation between them measured by the coefficient + 0·951. He calculates that the correlation between relative gold and the commodity price-index is + 0·938. He argues that if the correlation is nonsense in the one case it may be nonsense in our case.

There are two lines along which this argument can be countered.

First, the term "nonsense correlation" is not, in our opinion, very happily chosen, since it was apparently set up to illustrate a fallacy by no means confined to the correlational analysis of time series. The nonsense consists in applying, for the sake of studying the correlations between residuals, a process which only yielded the correlation between trends.

We suggest, again, that the habit of thinking of trends as things to be eliminated and of residuals as things to be studied is rather an academic convention. In practice one must apply thought and experience, and not automatic machinery, to determine which, if either, is to be discarded. The purpose of processes of fitting, or smoothing, is to *separate* these two elements of the observations, not necessarily to eliminate either of them. Necessarily, work with the residuals has a great advantage in providing a larger number of "degrees of freedom," or "independent comparisons," than has work with the trend. Nevertheless, there do occur cases, of which we believe this is one, in which the similarity of the trends provides the more important evidence of association; and when, as is shown in the discussion of our analysis by a parabola containing a log term, work with the residuals gives evidence of precedence, then we have useful evidence both as to the character of the association and as to its mode of origin.

Our second line of reply is that the cases are not comparable. In the case of the Marriages and Deaths the period selected is a part of an indefinable period, whereas in the case of relative gold and the commodity price-index, the period examined, 1850-1912, although only a segment of time, is, yet, a period complete in itself.

The period is complete in itself because the data follow a path which very closely approximates to a single revolution in a simple harmonic motion. See Clause 2 (*c*) above.

Our critic states that the movement of prices from 1800, onwards, is not periodic. In the paper, Section VIII (3) (*c*), we stated that fact. Nevertheless, in our view, the period 1850–1912 may be considered by itself because of its special characteristics.

Since it has been shown that the paths of both series follow the simple harmonic movement $y = \text{Sin } 0$ the "trends" must, therefore, lie along horizontal lines. These lines coincide with the respective arithmetic means. The correlation, therefore, measured from the arithmetic means, may be taken as the measure of association between the two series. This correlation we calculate to be + 0·937, which corresponds with the figure +0·938 as calculated by our critic. This is what we have called "geometric correlation."

In the comparison, however, of the Marriages and Deaths, since the period was incomplete, the correlation cannot be calculated from the arithmetic means because the trends do not lie along horizontal lines, therefore the downward, parallel trends should have been eliminated, and the correlation should have been calculated from the deviations from those trends. We have calculated the correlation between the deviations from a cubic parabola. The coefficient is found to be + 0·354 which is practically insignificant. Thus the so-called "nonsense" correlation does not exist. It merely expresses the fact that the two series have falling and nearly parallel trends. We calculated the correlation from the cubic parabola because the standard deviations become stable with a curve containing three constants, *i.e.* they do not become less when measured from a curve with four constants.

(e) *The suggestion that the correlation depends on the methods used.*

The same critic goes on to suggest that "the magnitude of the correlation observed is clearly quite largely dependent on the particular process used." Our reply is, that that will undoubtedly be the case if one of the two processes used for the calculation of the correlation coefficient is incorrect.

In this case the critic has, first, calculated one correlation coefficient, + 0·938, between the data of relative gold and those of the commodity price-index from their respective arithmetic means, and, second, he has calculated another correlation co-efficient, + 0·611, between the world's stock of gold money and the commodity price-index. In the calculation of the second correlation two different bases were used, the arithmetic mean for the commodity price-index and the $y = ab^x$ line for the world's stock of gold money. Our figures, calculated to check the processes used by the critic, are +0·937 and +0·615 respectively.

In our view these coefficients are not comparable. The first is a genuine correlation because it is calculated from the deviations from two comparable bases. The second is a spurious correlation because it has been calculated from the deviations from two incomparable bases, and it is incorrect to do this. See Dr. R. A. Fisher, *Statistical Methods for Research Workers*, 1928, p. 175.

If this critic had correlated from the $y = ab^x$ lines for both the world's stock of gold money and the commodity price-index, as shown on Chart II, he would have got a coefficient of +0·871.

It is, further, to be noted that this critic has correlated relative gold with the commodity price-index, from what we regard as comparable bases, and he has then correlated a different series, namely, the world's stock of gold money, with the commodity price-index from what we regard as incomparable bases.

(f) *The suggestion that the correlation from the parabola containing a log term is spurious.*

This criticism is of special interest and importance because it is only in the correlation from the base of the parabola containing a log term, with the data arranged in three-year blocks, that we have found any evidence of precedence. Even the analysis by that parabola of the annual data gave no such evidence. We looked for it in the correlations from the bases both of the cubic parabola and of the sine curve and found none. Obviously, without any evidence of precedence the information which has been derived from direct correlation is merely evidence of association.

Since our fundamental point is that in this analysis of time series it is necessary to take into account both the "trends" and the deviations from those trends, the lack of any evidence of precedence in the deviations from the curves used in the previous stages of the analysis led to the use of the equation containing a log term as being the most suitable type of curve which could include both a part of the trends and the deviations from those trends.

The path swept out by that parabola is asymmetrical. Since it is applied to two series of data, each of which has been shown to follow a simple harmonic movement, within the period analysed, it is obvious that this asymmetrical curve will intersect those harmonic movements at only a few points. Between those points are sections of the data. The data, of each series, which do *not* represent isolated points in a frequency series, but *do* represent *the movements of a point in space and time*, move along, but deviate from a simple harmonic movement which represents the continuous "trend" of movement of that point.

If two curves of type $y =$ Sin 0, having the same period, are intersected by two corresponding asymmetrical curves, and if the two series of data lie actually upon the $y =$ Sin 0 curves, then both lagged correlation coefficients will be of the same magnitude. But, since the two series of data deviate about the $y =$ Sin 0 paths, the extent to which the two lagged correlations differ in magnitude is evidence of precedence. In this case the two lagged correlation coefficients differ widely in magnitude. They are + 0·858 with relative gold preceding and + 0·317 with the commodity price-index preceding. Since the former is definitely significant, *i.e.* cannot arise from chance, whereas the latter is insignificant, the former gives evidence of precedence.

Clearly, it is no argument against this evidence of precedence to say, as one critic does, that the correlation must be spurious *because* the curve does not fit the data. The curve containing a log term was applied for the precise purpose of including part of "the slow changes" which our critic states should have been "eliminated to avoid spurious correlation." If this correlation had been the only evidence of association it *might*, taken by itself, raise the question whether it was spurious or not.

The importance of this evidence of precedence is that, given the evidence of association combined with the evidence of precedence, then the evidence of precedence shows where the association arises. Since we were only concerned, in this stage of the analysis, to find evidence of precedence as such, we had no need to investigate the length of the time interval, *i.e.* the duration of the lag, involved.

(g) *The suggestion that we should have used a certain criterion for determining whether a correlation is nonsense or not.*

Another critic has suggested that a criterion for the determination of the question whether a correlation is nonsense or not is to be found if the correlation when calculated from the second, third or higher differences becomes stable.

It is not clear if this critic means the variate difference method of correlation, but, if so, we need only say that

> " the defective character of the variate difference method, as originally proposed, is admitted." See Pearson and Elderton, *Biometrika,* March, 1923, cit. H. L. Rietz, *Handbook of Mathematical Statistics,* 1924, p. 164, footnote.

(h) *The suggestion that we have misused the term " significance."*

Various critics suggest that our use of the term " significance " in connection with correlation coefficients is misleading. On this point we quote Professor Warren M. Persons again, see *op. cit.,* pp. 162–3,

> " The 'probable errors' of coefficients of correlation (or other constants) computed from time series of economic statistics do not have the usual meaning. The theory of probability does not apply to our data because, first, any past period that we select for study is, in fact, a special period with characteristics distinguishing it from other periods, and so cannot be considered a 'random' selection; second, the individual items of the series are not chosen independently, but they constitute a *group* of successive items with a characteristic conformation."

The term significance as applied by us to correlation coefficients only refers to the probability that the correlation during the period investigated does not arise from chance, it is not a measure of probability that all other periods will yield a correlation of a similar magnitude plus or minus the probable error.

(i) *The criticism of the use of the figure 3·1 per cent.*

Several critics have commented on the figure 3·1 taken as the annual percentage addition to the world's stock of gold money of the previous year, needed to keep the trend of prices level. It has been objected that this figure has been obtained in an arbitrary way, that it probably was not a constant figure throughout the period, and that we should have set out to investigate it. In the summary of the paper read to the meeting of the Society we stated that our position in this matter was that we took the figure 3·1 from Annex XI, Table B, pp. 82–4, of the Interim Report of the Gold Delegation, 1930, and took it as *a working hypothesis*. We regard our analysis as a preliminary test of that hypothesis. It was, further, stated that work done after the paper was printed, but before it was read, went to show that the figure lies between the limits of 2·833 and 3·1. No doubt the figure needed varied from year to year; all that the figure of about 3·0 per cent. purports to be is the average figure.

(j) *The suggestion that it is useless to relate changes in wholesale prices with changes in monetary gold supply.*

To the critic who states that it was useless to try "to relate changes in wholesale prices to changes in the supply of monetary gold," since they are only two factors within a complex system, we can only reply that we were testing an hypothesis, often advanced, namely, that there did exist such a relation. See, for example, the Gold Delegation Interim Report, 1930.

(k) *The unemployment-commodity price-index relation.*

It is most interesting to learn that Mr. R. G. Hawtrey finds some real significance in our correlation between unemployment and the price-index, in which a change in unemployment preceded a change in the price-index; and that while he would not take our investigation as conclusive, he thinks it a case in which the theory is not at all inconsistent with the results.

It may be noted that the same precedence has been seen on inspection of graphs of the crude data by Professors Henry Clay and Pigou. Professor Henry Clay, *The Post-war Unemployment Problem*, 1929, p. 14, says,

> "Thus the order of movements would appear to be, first, production, then prices, then credit. Now this is the order that we should expect from the observation of business."

Professor Pigou, *Industrial Fluctuations*, 1927, p. 192, says,

> "So soon, however, as the chart is examined in detail, it becomes apparent that we cannot argue from it that the elimination of price movements would stop industrial fluctuations. For, on the whole, the turns in the unemployment curve *precede* the corresponding turns in the price curve."

3. *Conclusion.*

There are many other points raised by the critics which we should like to discuss, but the limits of space allowed for our reply prevent this. We think it important, however, to emphasise, that, as Sir Josiah Stamp has pointed out, we have avoided the use of the terms cause and causal relation.

We look forward to an opportunity of consulting that list of recent contributions to the theory of statistical analysis which one of our critics has promised to communicate to the Society. If he would add a list of what he regards as the best examples of the practical application of those methods to the analysis of problems such as those we have approached our interest would be intensified. The *Journal of the Royal Statistical Society* does not seem to contain many papers of that sort.

In conclusion, we may say that the reconsideration of our work, necessitated by the criticism we have had to meet, has deepened our conviction of the value of such methods of research as those illustrated in our paper, and their importance in connection with the future conduct of industry.

As a result of the ballot taken during the meeting, the candidates named below were elected Fellows of the Society:

Balvant Shankar Dabké, B.Com.
Sir William Dampier, F.R.S., Sc.D.
Nadir Ardeshir Daruwala, B.Com., A.S.A.A.
Leslie John Gollop, B.Sc.
Ernest Sturzenegger.
Stanford Hansel Howard Symons.
Harry Warner, A.S.T.C., M.I.Eng.S., M.A.I.P.H.

AN EXPERIMENT IN THE APPLICATION OF MATHEMATICAL METHODS OF STATISTICAL ANALYSIS TO SERIES OF ECONOMIC DATA.

(With special reference to the relations, in the period 1850 1912, between the data of the World's Stock of Gold Money, Sauerbeck's Commodity Price-Index, and Unemployment in Great Britain.)

Prepared in the Industrial Institute and communicated by the Committee of the Institute as a document received by them.

Note on the Objects and Constitution of the Institute.

(*a*) It is desirable to explain that the Industrial Institute is specially constituted for the twofold purpose of organizing co-operative research into fundamental problems of the Industrial Age and of promulgating any useful results of those researches.

(*b*) With the increasing volume and complexity of science the need for co-operation in research becomes ever more apparent. Similarly, with the increasing differentiation of individuals and groups, each with some special characteristic view-point, the difficulty grows of getting agreement, in regard even to fundamentals. Variously specialized workers in the scientific world become mutually incomprehensible. Two generations ago Darwin, concentrating on the points of similarity between species, confronted naturalists who had spent their lives in defining differences. Within the business system the interests of groups become sharply divided, at least in appearance. What appears self-evident to, say, organized labour may look like a class view to, say, the organized employers, and vice versa. Doctrine promulgated by either section is regarded with suspicion by the other. The rate at which truth diffuses is slow.

(*c*) The Institute is constituted in relation with these circumstances. The fact that its policy is directed by a Committee containing men holding high office in employer and labour organizations, and that all branches of industrial, commercial and financial activity are similarly represented on its Council, ensures that the results of its investigations can reach at once those responsible centres from which movements in the business system are influenced.

Note on the Authorship of the Paper.

This paper is mainly the work of the staff acting in concert with some members of the Institute and with some authorities outside it. The decision to attempt a contribution to the elucidation of economic problems, by means of mathematical analysis of relevant data, was made by the General Purposes Committee of the Institute. The particular questions to be investigated were determined by that Committee, a member of which is responsible for the general arrangement and the selection of the material used. Various members of the Institute, and others, have given valuable help. Those experts who have been good enough to examine papers previously given a limited private circulation, and have made comments thereon, may be regarded as having made contributions to the paper, though they have no responsibility for it. In the circumstances it has been thought best to ascribe it to the Institute, without the names of any individuals attached.

I. *Introductory.*

1. We are glad to have this opportunity of submitting to the Royal Statistical Society an example of our experimental investigations of the relations between various series of economic data by the method of mathematical analysis.

2. The Institute was invited by the Employers' Group of the Melchett–Turner Conference on Industrial Reorganization and Industrial Relations to prepare a report for the Conference on the Influence of Banking Policy and Monetary Technique upon Industry.

In the course of that work the Committee had, very emphatically, brought to their notice the great diversity of opinion which exists among experts, practical and scientific, on many questions touching monetary theory and banking practice, and the effects on industry of bank action.

3. This experience prompted the Committee to make an experiment with the application of the methods of mathematical analysis to various series of economic data, to see if a systematic analysis by those methods would give useful results. A selection from among those results is submitted in this paper, with the object of getting an expression of opinion from those present at the meeting on the question, whether the methods of analysis used are applicable to series of economic data.

4. The particular series of analyses herewith submitted are concerned with the relations between series of data representative of the World's Stock of Gold Money, the Commodity Price-Index, as measured by Sauerbeck's Index, continued by the *Statist*, and Unemployment in Great Britain.

5. (*a*) It is, perhaps, hardly necessary to say that the results of analysis, herewith submitted, make no pretence of providing anything of the nature of a final diagnosis and prognosis of the present world economic ills. Still less are they offered as suggesting a definite

prescription for effecting a cure. They are offered, however, as being, possibly, of some value as suggesting lines along which further investigation might be expected to yield some contributions to the solution of those problems.

(*b*) The work done is regarded as being of the nature of a preliminary survey of the field. It has been submitted to a preliminary test, by circulating sample analyses of particular relations to a number of experts, practical men of business, economists, statisticians and mathematicians, at home and abroad, with a request for comment.

Some of them drew attention to obscurities in wording which led to misconceptions of our meaning; adjustments have been made. Others pointed out over-statements; these have been modified. We have thus, already, been able to take steps towards that agreed statement at which we aim. All concur in the view that the practical questions on which the analysis has some bearing are of special interest at the present time.

6. We look forward to gaining much from the criticism of this meeting. It may be difficult, however, to profit equally from each critic, for criticism is sometimes equal and opposite!

Thus, one who has paid special attention to the output of gold has given his opinion that " The paper . . . has no redeeming point of contact with real fact," whereas an international banker writes that these are " most objective studies, which make a very serious and useful contribution to the establishment of the causes of the present depression."

Again, several state that mathematical analysis can never hope to do more than substantiate economic theory; for instance, " The task of the mathematical analysis in the economic field can never be anything else than to show the exact degree of correlation between theory and facts and possibly to prove that there are remaining movements for which a further explanation must be found "; whereas another writes, " I feel sure that your methods are ultimately likely to throw more light on the problem than any other method which has yet been used for this type of problem."

7. We are not yet prepared to dogmatize in regard to the data, the methods, or the interpretation of the results. We summarize, at the end of the paper, the conclusions it seems legitimate to draw from the analysis. This has been done with a view to the concentration of any discussion which may be held on the paper, and to focus it on the more significant of the questions at issue. We hope by those means we may be able to gather how far there exists any general agreement, at what points divergence of opinion originates, and what is the extent to which it may be possible to define such differences of opinion as may be found.

8. Arising from the discussion at this meeting we shall try to embody new and relevant comment in a revised exposition of the analysis, its results and conclusions. We propose to submit that revised statement to the criticism of a wider circle, both within the Institute and outside it, than were the memoranda which, with the incorporated criticism, form the basis of this paper. We hope to continue that process until an agreed statement can be made and issued as the finding of the Institute as a whole.

THE ANALYSIS.

II. *The Problem defined.*

1. (*a*) The fundamental fact with which we are concerned is that up-and-down movements occur in prices and, if an index of the price movements in a group of representative primary products, "commodities," be constructed, the index of prices also shows up-and-down movements.

(*b*) The problem we have set ourselves is to find the extent to which those movements of the price-index have been associated with movements in two other factors in the business system, namely, the world's stock of gold money and the unemployment returns for Great Britain.

2. The following is an experiment with the application of the tools of mathematical analysis to the elucidation of that problem.

3. (*a*) We have used Sauerbeck's commodity price-index for this investigation, and the movements of that index in the period 1850–1912 are shown in the line drawn in Graph 1.

The period investigated, namely, 1850–1912, was selected, in general, because it is a period free from recent disturbances, and, in particular, because it closely coincides with the period chosen for investigation by the Gold Delegation of the Financial Committee of the League of Nations, namely, 1850–1910. It differs slightly from this latter period because there was occasion in the analysis to use the data in three-year blocks, and with the addition of the two extra years 1911 and 1912 it gave the nearest period, in three-year blocks, which covered the period selected by the Gold Delegation.

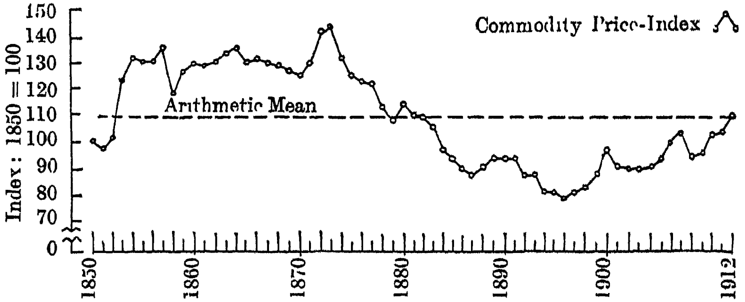
(*b*) The graph shows a series of short-term fluctuations. It suggests also a single, long-term, up-and-down movement.

(*c*) The long-term movement is more apparent when a horizontal line is drawn through the arithmetic mean of the data. It appears to be, approximately, symmetrical about the arithmetic mean, both in duration and amplitude.

4. It seems likely, therefore, that the problem of finding the extent of the association of the movements of the price-index with the

movements of other factors in the business system may be found to involve the problem of finding the extent of the association of those other factors with both long- and short-term movements of the price-index.

Graph 1.



III. *The Approach to the Problem.*

1. The short-term movements of the commodity price-index are indisputable, but the existence of the long-term movement may be questioned; evidence is, therefore, submitted which goes to establish the existence of that movement.

2. The line of approach to the problem is, therefore, to compare the movements of various factors in the business system, first with the long movements, and then with the short-term movements of the commodity price-index.

3. The business system contains both monetary and industrial factors, and in the following test analysis the movements of one factor in each category are compared with the movements of the commodity price-index.

4. The world's stock of gold money is an element in the monetary system, and unemployment in Great Britain is an industrial factor. Data of the movements of both factors throughout the period are available.

5. The commodity price-index, the world's stock of gold money and unemployment in Great Britain are each of them sufficiently involved in the world's business system to justify a comparison of their relative movements.

6. The preliminary stages in the investigation of the problem, as defined above, will therefore be taken in the following order :—

(1) The elucidation of what looks like a long-term movement in the commodity price-index.

(2) The search for any comparable movement in the path taken by (*a*) the accumulation of the world's stock of

gold money; (*b*) industrial activity, as measured inversely by unemployment.

(3) The comparison of—
- (A) The long-term movement in the commodity price-index with that movement—
    - (i) in the accumulation of the world's stock of gold money;
    - (ii) in unemployment.
- (B) The short-term movements in the commodity price-index with those movements—
    - (i) in the accumulation of the world's stock of gold money;
    - (ii) in unemployment.
- (C) The short-term movements of—
    - (i) the accumulation of the world's stock of gold money;
    - (ii) unemployment.

7. (*a*) It will be noticed that the fundamental characteristics of the phenomenon to be investigated are the movements of the data of the commodity price-index. Those movements are divisible into two, a long-term movement and a series of short-term movements.

(*b*) The following analysis is an experiment. It takes both those movements into account. It aims at making a combination of the Pearsonian method of correlation, in this case the correlation of deviations from defined curves, with the geometric correlation, *i.e.* the extent of the similarity of those curves when they are derived from the data investigated by the application of the same equation to each series.

(*c*) It is assumed that, even if a geometric similarity exists between the long-term movement of the commodity price-index and that of either or both of the other factors, it cannot be argued from that fact alone that one movement has any influence on the others. It is however, assumed that, if a Pearsonian correlation can be found between the deviations of any two, or more, of the factors from the curve derived from the same equation and used to analyse those movements, then such correlation is evidence of some association between the factors concerned.

IV. *On the Data analysed.*

1. We have taken the data for monetary gold from Mr. Joseph Kitchin, an acknowledged authority; and we have used as the data for the commodity price-index the figures derived from Sauerbeck

and as continued by the *Statist*. The data for unemployment are the Trade Union returns to the Board of Trade.

2. The problems involved in arriving at accurate estimates of the quantity of gold in the world's monetary system, as it accumulates, are difficult. The problem, also, of building up really scientific indices of prices of various sorts is highly complex. The unemployment returns are, undoubtedly, imperfect, but they are the only available data. We have made no attempt to go into those questions.

3. The objection that imperfect data are not fit subjects for the rigid methods of mathematical analysis is often raised.

It is, however, the view of many statisticians that imperfections in data destroy correlation when the data are analysed by the methods we have used. It is, further, the view of several that although imperfections in data might conceal correlation they could not create it.

Undoubtedly, the series of data used are open to improvement. The assumptions, however, on which we have worked are that the data have not been manipulated in any way to suit any particular purpose, and that whatever imperfections there may be in them, there is no reason to suppose that those imperfections, in themselves, have any mutual relation.

4. On the basis of those assumptions, and taking into account the considerations referred to above, we have thought it worth while to investigate the relations between the available data. We have, further, felt it reasonable to argue that if analysis of two series of data reveals some relation between them, then that relation represents something which exists in the phenomena themselves, something, that is, which has not been created by the methods of analysis or by errors in the data.

5. We are, in fact, disposed to stress the parallelism, or other relation, between the curves used in the process of analysis, a parallelism for which we seem to have found substantial evidence, as well as the correlations between the deviations from those curves.

V. *On the Development of this Preliminary Investigation.*

This paper has been limited to a preliminary and experimental analysis of the relation between three factors only in the business system. To get anything approaching an adequate picture of the working of that system, by the methods used, it is necessary to carry the investigation much further.

We have, in fact, worked out a considerable number of correlation coefficients between the movements of other factors. The results are, on the whole, consistent.

We propose to interconnect them, by the method of partial correlation, to determine the relations between the factors when the influence of those held steady has been removed.

We propose, when those partial correlations have been worked out, to apply regression equations to each two, or more, series of data, so as to obtain the mutual regressions when the factors found, by partial correlation, to be ineffective have been excluded.

VI. *Summary Statement of the Line taken in the Analysis and of the Results.*

Note.—The mathematical operations involved in each step of the analysis are given on the Table concerned.

A. *The analysis of the long-term movements.*

1. (*a*) On Chart I, Graphs 1, 2 and 3, and Table 1, the three series of observations are brought together for comparison. The problem is to find the extent to which the movements in the three series of numbers are associated.

(*b*) At first sight there does not appear to be any suggestion of a basis for comparison between the movements of the commodity price-index and those of the world's stock of gold money, but it looks as if there might be some association between the short-term movements of the commodity price-index and those of unemployment.

2. The approximate symmetry of the long-term movement of the commodity price-index, already referred to, suggests a search for some corresponding symmetry in a long-term movement in either of the other two series.

3. If the logarithms of the series of data of the commodity price-index and the world's stock of gold money are taken, and if these two series of numbers are analysed by fitting a $y = ab^c$ line, a certain symmetry in the long-term movement of gold money becomes apparent. The approximate symmetry of the long-term movement of the commodity price-index is still apparent; and there is apparent, also, a certain correspondence between the two symmetrical movements. See Chart II, Graphs 4 and 5.

4. (*a*) As some indication of a symmetrical movement in the long-term movement of gold money has been found in a logarithmic series, the suggestion arises that a comparison of the respective percentage * rates of change of the two series might give results.

(*b*) The rates of change in the two series have, therefore, been analysed both by a straight line, $y = a + bx$ and by a cubic parabola, $y = a + bx + cx^2 + dx^3$. The result again shows a symmetry in the two movements. See Chart III, Graphs 6 and 7, and Tables 2 and 3.

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* For the definition of "percentage rate of change," see Appendix, Note A.

(*c*) This analysis of the respective rates of change of the two series suggests that a uniform addition of 3 per cent. compound interest to the actual data of the world's stock of gold money would have been associated with an alteration in the long-term movement of the commodity price-index so that it would have had only short-term movements about a horizontal line. See Note to Tables 2 and 3.

5. (*a*) This result corresponds with the theory that the world's rate of general economic progress involves a more or less corresponding rate of progress in its several parts, including the rate of accumulation of its stock of gold money.

Various estimates of the rate of the world's economic progress have been made. The estimate of 3·1 per cent. per annum of the corresponding rate of accumulation of the stock of gold money is taken for the purpose of this analysis. See Interim Report of the Gold Delegation, p. 79.

(*b*) Chart IV, Graph 8, shows the path that would have been followed by the accumulation of the world's stock of gold money if it had increased at that rate. The data for this graph are given in Table B, pp. 82–84, of the Interim Report of the Gold Delegation. Graph 1, showing the path of the commodity price-index, is reproduced for comparison.

(*c*) In the path of this series of data the symmetry of the long-term movement of gold money about its compound interest line of 3·1 per cent. per annum is again apparent, as it was in the analysis of the logarithms of the data, Clause 3 above.

6. (*a*) So far, the analysis has shown a certain correspondence in the long-term movement of the commodity price-index and that of the world's stock of gold money. The next step is to search for as rigid a basis of comparison between the two movements as can be found.

(*b*) Returning to the long-term movement of the commodity price-index with which the analysis began, an obvious step is to smooth the path followed by the data by means of a moving average. The application of a seven-year moving average has been suggested by a prominent member of this Society as being suitable; that number has, therefore, been used. Chart V, Graph 9, shows the path of the data smoothed in that way. See also Table 4.

(*c*) The symmetry of the long-term movement about its arithmetic mean, both in duration and in amplitude, is now so clear that it suggests a sinusoid movement. To test this a sinusoid has been fitted to the data of the commodity price-index. See Chart V, Graph 10. It is remarkable how closely the data follow the sinusoid. See also Appendix, Note B.

7. Analysis of the data by an equation to a cubic parabola suggests itself because such a parabola is free to follow a sinuous path. Chart VI, Graph 11, shows the path swept out by the cubic parabola $y = a + bx + cx^2 + dx^3$. See also Table 5. The chart shows, also, the sinusoid, Graph 10, reproduced for comparison.

It is remarkable how closely similar is the path swept out by the cubic parabola to that of the sinusoid.

8. The symmetry of the path of the long-term movement of the commodity price-index may now be considered as demonstrated; and there have been found two definite bases for comparison between that movement and any such movement in the world's stock of gold money and in unemployment as may be found.

9. (*a*) At this stage in the analysis the theory of relative gold is used as a working hypothesis. In Clause 5, above, the path that would have been followed by the accumulation of the world's stock of gold money if it had increased at a compound interest rate of 3·1 per cent. per annum was used to bring out the symmetry of the path of the world's stock of gold money about that line.

(*b*) The datum of each year is constructed by taking the ratio of the world's stock of gold money of that year to a certain calculated quantity in that year. The calculated quantity for each year is arrived at by taking the actual quantity of the world's stock of gold money in 1850, the beginning of the series, and increasing that quantity annually at the compound interest rate of 3·1 per cent. per annum. The ratio between the two, *i.e.* the ratio of the actual to the calculated figure, is then multiplied by 100.

(*c*) This series of constructed data is called the world's *relative* stock of gold money for each year. The path followed by these data is shown in Chart VII, Graph 12. See also Table 6.

(*d*) A certain similarity between that path and the path of the commodity price-index is now apparent. See Graph 1, Chart I.

(*e*) This similarity is slightly increased if the data of relative gold are smoothed by a seven-year moving average, as the path of the commodity price-index was smoothed. See again Chart VII, Graph 12, and compare this with Chart V, Graph 9.

10. This suggests a comparison of the sinusoid of relative gold with that of the commodity price-index. The sinusoid fitted to the data of relative gold is shown on Chart VII, Graph 13. Compare this with the sinusoid of the commodity price index, Chart V, Graph 10.

11. This suggests an analysis of the data of relative gold by an equation to a cubic parabola, $y = a + bx + cx^2 + dx^3$, and a comparison of the path swept out by that parabola with the path of the

sinusoid. See Chart VIII, Graph 14, and Table 7 and Graph 13, reproduced from Chart VII.

It is, again, remarkable how closely similar is the path swept out by the parabola to that of the sinusoid. Compare Clause 7, above.

12. This suggests a comparison of the path swept out by that cubic parabola, $y = a + bx + cx^2 + dx^3$, when applied to the data of relative gold with the path of that parabola when applied to the data of the commodity price-index. The paths of these cubic parabolas applied to their respective data are shown on Chart IX, Graphs 15 and 16. See also Tables 8 and 9.

It is, again, to be noticed that these two paths are closely similar.

13. (*a*) The next step is to analyse the data of unemployment by an equation to the same cubic parabola that has been applied to the data of the commodity price-index and of relative gold. The result is shown on Chart IX, Graph 17. See also Table 10.

No long-term movement in unemployment, similar to those of the commodity price-index and of relative gold, appears as the result of this analysis. The path swept out by the parabola is nearly a horizontal straight line.

(*b*) It is interesting to find that the application of the equation for a cubic parabola, $y = a + bx + cx^2 + dx^3$, to the series of unemployment data results in a curve which is approximately a straight line.

(*c*) Since the curve derived from the cubic parabola when applied to the data of unemployment follows an approximately straight line, whereas the curves from the same equation, when applied to data of the commodity price-index and of relative gold, follow similar sinuous lines, it can be concluded that the paths followed by the curves derived from that equation depend, for their shape, on the data to which they are applied and represent something inherent in, and characteristic of, the data to which they are applied.

(*d*) Further, since the long-term movement of the commodity price-index is so similar to that of relative gold, it can be inferred that the long-term movement in each of those series of data was "geometrically" correlated throughout the period investigated.

14. (*a*) As the paths swept out by the two cubic parabolas when applied to the data of the commodity price-index and relative gold are both so symmetrical, the question arises how far the movements of the two series of data would be comparable when analysed by an equation to a curve which would not follow a symmetrical path. To answer this an equation containing a log function, $y = a + bx + cx^2 + d \log x$, is applied to both series. The paths swept out by the resulting curves are shown on Chart X, Graphs 18 and 19. See also Tables 11 and 12. It is again apparent that there is a close similarity in those two curves. They are closely parallel.

(*b*) The curves containing the log function do not fit the data as closely as do the moving averages, the sinusoids or the cubic parabolas. They do, however, retain the fundamental character of the mutual relations between those curves in that they take closely parallel paths. In fact, it can be seen from the constants given in Tables 11 and 12 that the differential terms of the equation, *i.e.* bx, cx^2 and $d \log x$, are nearly identical.

(*c*) The next step is to analyse the data of unemployment by the same equation, $y = a + bx + cx^2 + d \log x$. The result is shown on Chart X, Graph 20. See also Table 13.

The path swept out by this " log parabola " is nearly a horizontal straight line, as was the path swept out by the cubic parabola; but in this case there appears a *very* slight long-term movement, moving upwards and downwards with the long-term movement of the commodity price-index and of relative gold.

(*d*) As in the comparison of the curves swept out by the cubic parabola, Clauses 13 (*c*) and (*d*) above, a corresponding similarity of the two paths swept out by the " log parabola," when applied to the analysis of the data of the commodity price-index and of relative gold, and a corresponding dissimilarity from those paths of the path swept out by this parabola when applied to the data of unemployment, are found. The argument, therefore, again holds that the paths followed represent something inherent in, and characteristic of, the data and that from the similarity of the long-term movement of the data of the commodity price-index and of relative gold it can be, again, inferred that the long-term movement of each of those series of data was itself " geometrically " correlated throughout the period investigated. The sinusoids and the cubic parabola do, however, fit the data more closely than does the " log parabola." Therefore, the former are more characteristic of the actual paths of the data than is the latter.

15. (*a*) The analysis of the data arranged in blocks of three years is the next step in the analysis of the long-term movement. The reasons for arranging the data in blocks of three years * are given in the following portion of the analysis, devoted to the investigation of the relations between the short-term movements of the three factors. See Section VI, B. 4 (*a*).

As before, these series are analysed by the sinusoid, cubic parabola and " log parabola."

(*b*) Chart XI, Graphs 21 and 22, show the paths of the sinusoids. It is, again, to be noticed that the data of both series follow the sinusoids, but the data of the commodity price-index follow their sinusoid more symmetrically than do the data of relative gold.

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* For the definition of " data in blocks of three years," see Appendix, Note C.

(*c*) Chart XII, Graphs 23 and 24, show the paths swept out by the cubic parabola. See also Tables 14 and 15.

It is, again, remarkable how closely similar are the paths swept out by the cubic parabola to those of the corresponding sinusoids.

Chart XII, Graph 25, shows that the paths swept out by the cubic parabola are more closely similar than are the corresponding paths in the annual data. Compare Chart IX, Graphs 11 and 12.

(*d*) Chart XIII, Graphs 26 and 27, show the paths swept out by the "log parabola." See also Tables 16 and 17.

It is, again, to be noticed that their paths are closely similar. See Chart XIV, Graph 28. Compare also Chart X, Graphs 18 and 19, showing the *annual* data analysed by the "log parabola."

16. This completes the analysis, so far as it has yet been carried, of the relation between the long-term movement of each of the series investigated. It appears that, in the period, there existed a close similarity between the long-term movement of the commodity price-index and that of relative gold. This is shown in the comparable symmetry of the movement in each case; and, when the constructed data of relative gold are used, that symmetry is so close, both in the amplitude of the movement of each series and in the duration of that movement, that a close parallelism between them is apparent. In other words, there existed in the period investigated a "geometric correlation," as distinct from the Pearsonian product moment correlation, between the long-term movement of the commodity price-index and that of the world's stock of gold money.

There has been found, however, no comparable similarity between the long-term movement of unemployment and either that of the commodity price-index or that of monetary gold.

17. It appears, therefore, that the following deduction from this part of the analysis may be made, and used as a working hypothesis to be investigated by further analysis.

Whatever factors may have operated within the business system to induce the long-term movement in the commodity price-index and in the world's stock of gold money, those factors have not had a commensurate effect on the industrial part of the system as measured by industrial activity, taken as the inverse of unemployment. If the operation of those factors, or the influence of changes in the long-term movement of the commodity price-index and/or of gold money, have had an effect on the industrial system, so measured, they must either have cancelled each other or the industrial system must have adjusted itself, in some way, to the influence of those factors so that no long-term movement, of any significant magnitude, is apparent in the period investigated.

B. *The Analysis of the Short-term Movements.*

1. (*a*) In working out the mutual relations of the long-term movement of the data of the commodity price-index, the world's stock of gold money and unemployment, the respective data were analysed by a straight line, a moving average, a sinusoid curve, a cubic parabola and a parabola containing a log function. The mutual relations of the short-term movements of each of those factors have to be determined.

(*b*) This has been done, and the Pearsonian coefficients of correlation have been determined in each case. That is to say, the deviations of the data of the commodity price-index, the world's stock of gold money and of unemployment from each of the curves used in the analysis of the long-term movement of each series have been compared for correlation.

(*c*) In each case the direct and the two lagged correlation coefficients have been determined. The lagged coefficients are worked out when, first, the data of one series is arranged one year in front of the other series, and then, when the data of the second series are arranged, one year in front of the first series. The result makes comparison possible between the direct correlation coefficient and each of the two "lagged" correlation coefficients. If either of the lagged correlation coefficients is found to be more significant than the direct one it is taken as evidence that changes in the series, thus made to occur before changes in the other series, did, in fact, occur before the changes in that series.

When, however, the significant lagged correlation is less significant than the direct correlation, it can only be taken as evidence that there existed, in fact, a *tendency* for the changes in one series to occur before the changes in the other series.

Note.—The significance attached to the various correlation coefficients, namely, definitely significant (def. sig.), significant (sig.), insignificant (insig.), is taken from the Table given in Dr. R. A. Fisher's *Statistical Methods for Research Workers*, 1928, p. 176. The formula for the calculation of the significance is given on pp. 159–60.

2. The results of those comparisons are as follows :—

(*a*) The correlation of the annual data of the commodity price-index with those of relative gold.

(i) Calculated from the curves smoothed by a seven-year moving average.

a. Direct	+ 0·243, insig.
b. Lagged, when the price-index is made to precede	+ 0·203, ,,
c. Lagged, when relative gold is made to precede	+ 0·053, ,,

(ii) Calculated from the sinusoid.

a. Direct	+ 0·336, sig.
b. Lagged, when the price-index is made to precede	+ 0·314, ,,
c. Lagged, when relative gold is made to precede	+ 0·216, insig.

(iii) Calculated from the cubic parabola.

a. Direct	+0·274, insig.
b. Lagged, when the price-index is made to precede	+ 0·266, ,,
c. Lagged, when relative gold is made to precede	+ 0·139, ,,

(iv) Calculated from the parabola containing a log function.

a. Direct	+ 0·635, def. sig.
b. Lagged, when the price-index is made to precede	+ 0·451, sig.
c. Lagged, when relative gold is made to precede	+ 0·522, def. sig.

(*b*) The result is that the most significant correlation coefficients have been found between the annual deviations from the parabola containing a log function.

3. (*a*) The correlation of the annual data of the commodity price-index with those of unemployment.

(i) Calculated from the cubic parabola.

a. Direct	− 0·558, def. sig.
b. Lagged, when the commodity price-index is made to precede	0·139, insig.
c. Lagged, when unemployment is made to precede	- 0·484, sig.

(ii) Calculated from the parabola containing a log function.

a. Direct	0·428, sig.
b. Lagged, when the commodity price-index is made to precede	0·119, insig.
c. Lagged, when unemployment is made to precede	- 0·360, just sig.

(*b*) The correlation of the annual data of relative gold with unemployment.

(i) Calculated from the cubic parabola.

a. Direct	+ 0·0126, insig.
b. Lagged, when relative gold is made to precede	—0·0076, ,,
c. Lagged, when unemployment is made to precede	—0·0324, ,,

(ii) Calculated from the parabola containing a log function.

a. Direct ... ... —0·109, insig.
b. Lagged, when relative gold is made to precede ... ... —0·065, „
c. Lagged, when unemployment is made to precede ... ... —0·110, „

(*c*) The result is that the annual deviations of the commodity price-index are correlated with the annual deviations of unemployment in such a way that changes in unemployment preceded changes in the commodity price-index; but no correlation has been found between the deviations of relative gold and unemployment.

(*d*) However, since a correlation between the annual deviations of the commodity price-index and those of unemployment has been found, and since the annual deviations of the commodity price-index are superposed upon a long-term movement of the commodity price-index, which is very similar to the long-term movement of relative gold, it is possible that the annual deviations in the commodity price-index may be associated with the changes in other factors in the business system besides the changes in unemployment.

(*e*) Further, the fact that a definitely significant correlation has been found between the annual deviations of the commodity price-index and those of relative gold, when analysed by the parabola containing a log function, but no such correlation between their respective deviations from the moving average, the sinusoid or the cubic parabola, needs some explanation.

Probably, this explanation is to be found in the asymmetry of the curve derived from the equation containing the log function. Such a curve excludes the minor annual deviations dispersed about the curves derived from the moving averages, the sinusoid and cubic parabola.

4. The correlation of the data taken in three-year blocks.

(*a*) The analysis of the relation of the actual gold money data and the commodity price-index in Section A, Clauses 4 (*a*), (*b*) and (*c*) above, suggested, from the six-year interval between the points of intersection of the straight and curved lines, that a difference in time occurred between the respective movements. This suggested an arrangement of the data in blocks of three years because, when the data are arranged in blocks of three years and are lagged one interval of three years, then the period included by lagging is six years. See Chart III, Graphs 6 and 7.

(*b*) The correlation of the data of the commodity price-index and of relative gold arranged in three-year blocks.

(i) Calculated from the sinusoid.

a. Direct	+0·392, just sig.
b. Lagged, when the commodity price-index is made to precede by one block ...	+0·276, insig.
c. Lagged, when relative gold is made to precede by one block	+0·002, „

(ii) Calculated from the cubic parabola.

a. Direct	+0·373, just sig.
b. Lagged, when the commodity price-index data are made to precede by one block	+0·240, insig.
c. Lagged, when the relative gold data are made to precede by one block	—0·040, „

(iii) Calculated from the parabola containing a log function.

a. Direct	+0·632, def. sig.
b. Lagged, when the commodity price-index data are made to precede by one block	+0·317, insig.
c. Lagged, when the relative gold data are made to precede by one block	+0·858, def. sig.

See Chart XIV, Graph 29, and Chart XV, Graphs 30 and 31.

(*c*) The results show that the most significant correlation has been found between the data arranged in three-year blocks, and when calculated from the parabola containing a log function.

In this case the lagged correlation in which the movements of relative gold are made to precede the movements of the commodity price-index is higher than the direct correlation; moreover, the other lagged correlation, with the commodity price-index moving first, is insignificant.

Note.—It is interesting to find that the correlation coefficients calculated from the sinusoid and from the cubic parabola are very similar.

VII. *Conclusions derived from the Analysis.*

The following is a summary statement of the results of the analysis of the movements of the factors concerned within the period investigated, 1850–1912.

A. *The long-term movement.*

(1) The long-term movement of the commodity price-index was associated with the long-term movement of relative gold money in such a way that a close parallelism existed between them.

(2) The long-term movement of the commodity price-index has not, so far, been shown to have had any association with the long-term movement of unemployment which followed an approximately horizontal path.

(3) The long-term movement of the relative gold money has not, so far, been shown to have had any association with the long-term movement of unemployment.

B. *The short-term movements.*

(1) The short-term movements of the commodity price-index were associated with the short-term movements of relative gold in such a way that there was a tendency for the movements in relative gold to precede the movements in the commodity price-index.

(2) The short-term movements of the commodity price-index were associated with the short-term movements of unemployment in such a way that there was a tendency for the movements in unemployment to precede the movements in the commodity price-index.

(3) The short-term movements of relative gold have not, so far, been shown to have had any association with the short-term movements in unemployment.

VIII. *Deductions.*

It seems legitimate to draw the following deductions from these results; they may, at least, be used as working hypotheses from which to carry to a further stage an investigation of the mutual relations of the three factors.

(1) (*a*) The tendency to the precedence of changes in the short-term movements of monetary gold in respect to changes in the short-term movements of the commodity price-index is sufficient to induce the tendency towards parallelism in the long-term movement of each of the two factors.

(*b*) The departures from parallelism leave some room for the long-term influence of other factors on the long-term movement of the commodity price-index, such as the slow change over from a bimetallic to a gold basis, and the development of banking technique by means of which a given quantity of gold has been made to form the basis of an increasing quantity of means of payment.

(2) (*a*) The tendency to the precedence of changes in unemployment in respect to changes in the commodity price-index is sufficient to induce part of the short-term movements of the commodity price-index, *i.e.* part of the deviations of the commodity price-index from the base of the long-term movement.

(*b*) The incompleteness of that correlation leaves room for the influence of other factors on the short-term movements of the commodity price-index, such as changes in the technique of production and changes in the relation between the supply and demand of particular commodities or groups of commodities.

(3) (*a*) It would appear that the result of this preliminary investigation provides what may be a firm basis from which a more complete analysis of the pre-war period can be undertaken. It may provide, also, a basis from which an investigation of the relations of the several factors in other periods may proceed. The line indicated for those further investigations is outlined in Clause V, p. 230 1.

(*b*) Before undertaking a more detailed survey of the associations of the factors concerned, including factors not referred to in this paper, in the period 1850–1912, it will, perhaps, be more useful to compare the associations already determined for that period both with those which existed in the antecedent period, say 1800 50, and with those which hold in the war, post-war and present period, 1914- 31.

(*c*) It is not to be assumed that the symmetrical movement found in the period 1850–1912, associated apparently with the discoveries of new gold-fields, will repeat itself, nor is it to be assumed that it occurred in any period before that investigated. Indeed, inspection of the data of the antecedent period, say 1800-50, suggests that no such symmetrical movement did exist.

(*d*) Since 1912 the relation between monetary gold and the commodity price-index which existed 1850–1912 has been disturbed in various ways. The gold standard was abandoned by Great Britain and many other countries during the war; the pre-war method of working the system was never fully restored; gold accumulated disproportionately in various countries; the gold standard has recently been abandoned again by Great Britain and other countries. These disturbances call for analysis.

(*e*) If the pre-war working of the gold standard were restored, then, presumably, the association between the movements of the world's stock of gold money and the commodity price-index, which existed pre-war, would also be restored, and the commodity price-index would move, as it did pre-war, in accordance with the movements of the world's stock of gold money. It follows, if it were desired that the commodity price-index should *not* move in that way, then some change in the pre-war working of the gold standard would be needed. That change would, necessarily, involve a change which would permit of a reduction in the closeness of the association between gold and prices which appears to have existed in the period investigated.

(*f*) The question whether it is desirable and practicable to restore the pre-war working of the gold standard, in whole or in part, and the question whether it is desirable and practicable to amend the working of that standard in such a way that the association between gold and prices would be altered, are questions outside the scope of this paper.

The development of the analysis may be summarised as follows :—

A. The Analysis of the Long-term Movements of the Three Factors.

1. At first sight there is no apparent basis for comparison between the long-term movement of each series.
2. The approximate symmetry of the long-term movement of the commodity price-index suggests a search for some corresponding symmetry in the long-term movement in each of the other factors.
3. The commodity price-index and the world's stock of gold money when analysed by $y = ab^x$ show a correspondence between the symmetrical movement of each series.
4. The percentage rates of change analysed by $y = a + bx$ and by $y = a + bx + cx^2 + dx^3$. The correspondence in symmetry of the two movements again appears.
5. The data of the world's stock of gold money also show a symmetry about the compound interest line of 3·1 per cent. per annum. The difference between the world's *actual* stock of gold money and this compound interest line is termed the world's *relative* stock of gold money.
6. When the data of the commodity price-index are smoothed by a seven-year moving average the symmetry is more apparent. This is tested by applying a sinusoid, $y = \text{Sin}\ \theta$, to the data. The data fit the sinusoid closely.
7. Analysis by $y = a + bx + cx^2 + dx^3$ gives a path closely similar to the sinusoid.

8–12. The data of relative gold when analysed in the same way give similar results.

13. The unemployment data analysed by $y = a + bx + cx^2 + dx^3$ gives a curve which is approximately a straight line.

    The paths swept out by the curves when derived from the data by the same equation represent something inherent in the data.
14. The paths swept out by the equation $y = a + bx + cx^2 + d \log x$ which *do not* follow symmetrical paths, when applied to the data of the commodity price-index and of relative gold, are also parallel.

    The unemployment data when analysed by this equation, again, follow a nearly horizontal line.
15. The data of the commodity price-index and of relative gold, arranged in blocks of three years, when analysed by the same three curves—sinusoid, cubic and log parabola—give similar results.
16. There is thus, in the period, a close similarity in the long-term movement of the commodity price-index and the long-term movement of relative gold.

    But no comparable similarity in the long-term movement of unemployment with that of the other factors.
17. Whatever factors may have operated within the business system to induce the long-term movement in the commodity price-index and in the world's stock of gold money, those factors have not had a commensurate effect on the industrial part of the system as measured by industrial activity, taken as the inverse of unemployment.

B. The Analysis of the Short-term Movements.

1. The deviations of the data of each of the three factors from each of the curves used to analyse the long-term movements of each series are compared for correlation.

   In each case the direct and lagged correlations are determined.
2. In the relation of the commodity price-index and relative gold the most significant correlation is found in the deviations from the log parabola.

   The probable explanation of this fact is that such a curve excludes the minor annual deviations dispersed about the other curves.
3. In the relation of unemployment with the commodity price-index the most significant correlation is in the annual data when analysed by the cubic parabola.

   There is an indication from the lagged correlations that unemployment tended to precede the commodity price-index.

   In the relation of unemployment with relative gold there is no significant correlation, direct or lagged.

   The correlation of the commodity price-index with relative gold and the lack of correlation between relative gold and unemployment shows that the commodity price-index is associated with factors other than gold.
4. The data of the commodity price-index and of relative gold when analysed by the same three curves give the most significant correlation when the data are analysed by the log parabola and when relative gold is made to precede the commodity price-index.

   The probable explanation of this is the same as that given in Clause B 2, above

APPENDIX.

Definitions.

Note A.—Note to Section A, Clause 4 (*a*).

The Definition of "percentage rates of change."

In 1850 the world's actual stock of gold money amounted to £230 million, and in 1851 it amounted to £243 million. Taking the 1850 amount as the base, 100, then the 1851 amount is a change from 100 to 105·65.

The "*rate of change*" in that year is represented by this figure, 105·65. It is a percentage change of 5·65 from the previous year.

Similarly, the "rate of change" for 1852 is obtained from the figures of the year 1851. The world's actual stock of gold money in 1851 was £243 million, and in 1852 it was £268 million. Taking the 1851 amount as the base, 100, then the 1852 amount is a change from 100 to 110·29. It is a percentage change of 10·29 from the previous year.

The rate of change of commodity prices is calculated in the same way.

Note B.--Note to Section A, Clause 6 (*c*).

On the application of the sinusoid.

1. The period investigated, namely, 1850–1912, was selected, in general, because it is a period free from recent disturbances, and, in particular, because it closely coincides with the period chosen for investigation by the Gold Delegation of the Financial Committee of the League of Nations, namely, 1850–1910. It differs slightly from this latter period because there was occasion in the analysis to use the data in three-year blocks, and with the addition of the two extra years 1911 and 1912 it gave the nearest period, in three-year blocks, which covered the period selected by the Gold Delegation.

2. A symmetrical movement has been found in the period 1851–1911 which covers practically the whole period investigated. The data for the antecedent period, 1800–50, do not suggest a similar symmetrical movement.

3. The existence of a symmetrical movement became apparent at an early stage of the analysis when the logarithms of the data of the commodity price-index and of the world's stock of gold money were analysed by the equation $y = ab^x$. See Section A, Clause 3, and Chart II, Graphs 4 and 5.

4. That analysis gave the year 1881 as the central point of the movement.

5. The long-term movement of the commodity price-index began to move upwards in the year 1851.

6. The straight line $y = a + bx$, derived from the actual data of the commodity price-index for 1851–1911, from which the sinusoid is developed, cuts the arithmetic mean of the data at the year 1881, *i.e.* at the central point of the movement found by the analysis referred to in Clause 3 above.

7. The arithmetic mean of the first half of the period, 1851–81, lies *above* the arithmetic mean of the whole period by the same amount that the arithmetic mean of the second half of the period, 1881–1911, lies *below* the arithmetic mean of the whole period.

8. The characteristics of the data of relative gold correspond with those of the commodity price-index in both particulars described in Clauses 6 and 7 above.

9. Although we have had occasion to compare the sinsuoid of the commodity price-index with that of relative gold we have not concerned ourselves, in this paper, with the phase of either movement in respect to the other. In this case the sinusoids have been obtained from the $y = a + bx$ line derived from both series of data.

10. No doubt the extent to which the two sinusoids may be out

of phase is of importance. In this paper, however, the question of the precedence of the respective movements of relative gold and the commodity price-index has been investigated in connection with the precedence of the short-term movements, in which a correlation has been found.

11. The important point is that the data have been considered as a non-recurrent group. The sinusoids are not derived *direct* from each annual datum, *i.e.* they are not "fitted" to the data in the sense that a cubic parabola has been fitted to the data. The process by which the sinusoids are derived from the data is such that they provide a means of comparison of the two series of actual data with their respective sinusoids.

Note C.—Note to Section A, Clause 15 (*a*).

The Definition of "the data in blocks of three years."

By "the data arranged in blocks of three years" is meant the averages of the annual data of each group of three consecutive years. It is *not* a three-year moving average.

TABLE 1.

See Chart I, Graphs 1, 2 and 3.

Data of World's Stock of Gold Money and Data of the Commodity Price-Index, 1850 = 100.

From the Interim Report of the Gold Delegation of the Financial Committee, League of Nations, No. C. 375, M. 161. 1930. II. Annex XI. Table B, Columns 1 and 4, p. 82.

Unemployment in Great Britain (Trade Union Returns), 1850–1912. From British and Foreign Trade and Industry (Second Series) (Cd. 2337) and 17th Abstract of Labour Statistics.

Note.—Persons on strike or locked out, sick, or superannuated, are excluded.

Year.	Commodity Prices.	World's Stock of Gold Money £ mln.	Unemployment.	Year.	Commodity Prices.	World's Stock of Gold Money. £ mln.	Unemployment.
1850	100	230	4·0	1882	109	653	2·3
51	97	243	3·9	83	106	657	2·6
52	101	268	6·0	84	97	662	8·1
53	123	294	1·7	85	94	670	9·3
54	132	316	2·9	86	90	681	10·2
55	131	338	5·4	87	88	689	7·6
56	131	361	4·7	88	91	701	4·9
57	136	382	6·0	89	94	711	2·1
58	118	401	11·9	90	94	720	2·1
59	127	417	3·8	91	94	733	3·5
60	130	433	1·9	92	88	753	6·3
61	129	447	5·2	93	88	774	7·5
62	131	459	8·4	94	82	802	6·9
63	134	468	6·0	95	81	827	5·8
64	136	476	2·7	96	79	852	3·3
65	131	490	2·1	97	81	882	3·3
66	132	506	3·3	98	83	921	2·8
67	130	519	7·4	99	88	958	2·0
68	129	531	7·9	1900	97	989	2·5
69	127	543	6·7	01	91	1022	3·3
70	125	556	3·9	02	90	1056	4·0
71	130	568	1·6	03	90	1093	4·7
72	142	577	0·9	04	91	1132	6·0
73	144	586	1·2	05	94	1188	5·0
74	132	594	1·7	06	100	1231	3·6
75	125	601	2·4	07	104	1278	3·7
76	123	610	3·7	08	95	1346	7·8
77	122	621	4·7	09	96	1400	7·7
78	113	634	6·8	10	103	1446	4·7
79	108	639	11·4	11	104	1489	2·1
80	114	643	5·5	12	110	1528	3·3
81	110	649	3·5				

TABLE 2.

See Chart III, Graph 6.

World's Stock of Gold Money (end of year).
From the Interim Report of the Gold Delegation of the Financial Committee.
League of Nations, No. C. 375, M. 161. 1930. II.
Annex XI. Table B, Column 1.
Analysis of annual rate of change, Column 2.

Year.	Gold Money. £ mln.	Annual Rate of Change.	Ordinates $y = a + bx + cx^2 + dx^3$.	Deviations from $y = a + bx + cx^2 + dx^3$.
1851	243	105·65	108·84	−3·19
52	268	110·29	108·21	+2·08
53	294	109·70	107·29	+2·41
54	316	107·50	107·03	+0·47
55	338	106·96	106·49	+0·47
56	361	106·80	106·18	+0·62
57	382	105·82	105·50	+0·32
58	401	104·97	105·06	−0·09
59	417	104·00	104·64	−0·64
60	433	103·84	104·25	−0·41
61	447	103·24	103·89	−0·65
62	459	102·69	103·55	−0·86
63	468	101·96	103·24	−1·28
64	476	101·71	102·99	−1·28
65	490	102·94	102·70	+0·24
66	506	103·27	102·47	+0·80
67	519	102·57	102·25	+0·32
68	531	102·31	102·07	+0·24
69	543	102·26	101·90	+0·36
70	556	102·40	101·75	+0·65
71	568	102·16	101·62	+0·54
72	577	101·59	101·52	+0·07
73	586	101·56	101·43	+0·13
74	594	101·37	101·36	+0·01
75	601	101·18	101·31	0·12
76	610	101·50	101·27	+0·32
77	621	101·80	101·25	+0·55
78	634	102·09	101·24	+0·85
79	639	100·79	101·25	−0·46
80	643	100·63	101·27	0·64
1881	649	100·94	101·30	0·36
82	654	100·62	101·35	0·73
83	657	100·61	101·41	0·80
84	662	100·76	101·48	−0·72
85	670	101·21	101·55	−0·34
86	681	101·64	101·64	0
87	689	101·17	101·73	0·56
88	701	101·74	101·84	0·10
89	711	101·43	101·94	0·51
90	720	101·27	102·06	0·79
91	733	101·80	102·18	0·38
92	753	102·73	102·30	+0·43
93	774	102·79	102·43	+0·36
94	802	103·62	102·56	+1·06
95	827	103·12	102·70	+0·42
96	852	103·03	102·83	+0·20
97	882	103·52	102·97	+0·55
98	921	104·42	103·10	+1·32
99	958	104·02	103·23	+0·79
1900	989	103·24	103·37	−0·13
01	1022	103·34	103·50	−0·16
02	1056	103·33	103·63	0·30
03	1093	103·51	103·75	0·24
04	1132	103·57	103·87	0·30
05	1188	104·95	103·98	+0·97
06	1231	103·62	104·08	0·46
07	1278	103·82	104·19	−0·37
08	1346	105·32	104·29	+1·03
09	1400	104·02	104·37	0·35
10	1446	103·29	104·45	1·16

Cubic Parabola:

$$y = 109{\cdot}517063 - 0{\cdot}690078x + 0{\cdot}017587x^2 - 0{\cdot}0001249x^3.$$

Standard Deviation from Cubic Parabola ± 2·629.

Regression Line:

$$y = a + bx = 104{\cdot}147092 - 0{\cdot}033238x.$$

Note.—The sum of the annual rates of change of the World's Stock of Gold Money amounts to 6188 per cent. in 60 years, the mean rate of change is 103·133 per cent.

The sum of the annual rates of change of Commodity Prices, as measured by Sauerbeck's Price-Index amounts to 6009·93 per cent. in 60 years, the mean rate of change is 100·163 per cent.

As the ratio of 103·133 to 100·163 is the same as the ratio of 103 to 100, an annual average increase of very nearly 3 per cent., 2·965, in the World's Stock of Gold Money, during the period 1850–1910, was required to keep the level of Commodity Prices horizontal.

TABLE 3.

See Chart III, Graph 7.

Sauerbeck's Price-Index.
From the *Statist.*
Base 1867–77 = 100.
Analysis of annual rate of change.

Year.	Sauerbeck's Price-Index.	Annual Rate of Change.	Ordinates $y = a + bx + cx^2 + dx^3$.	Deviations from $y = a + bx + cx^2 + dx^3$.	Year.	Sauerbeck's Price-Index.	Annual Rate of Change.	Ordinates $y = a + bx + cx^2 + dx^3$.	Deviations from $y = a + bx + cx^2 + dx^3$.
1851	75	97·43	102·85	− 5·42	1881	85	96·59	98·49	− 1·90
52	78	104·00	102·73	+ 1·27	82	84	98·82	98·43	+ 0·39
53	95	121·79	102·59	+10·20	83	82	97·62	98·37	− 0·75
54	102	107·37	102·44	+ 4·59	84	76	92·68	98·33	− 5·65
55	101	99·02	102·29	− 3·27	85	72	94·74	98·31	− 3·57
56	101	100·00	102·14	− 2·14	86	69	95·83	98·29	− 2·46
57	105	103·96	101·98	+ 1·98	87	68	98·55	98·29	+ 0·26
58	91	86·67	101·82	−15·15	88	70	102·94	98·31	+ 4·63
59	94	103·30	101·65	+ 1·65	89	72	102·86	98·34	+ 4·52
60	99	105·32	101·48	+ 3·84	90	72	100·00	98·39	+ 1·61
61	98	99·00	101·31	− 2·31	91	72	100·00	98·45	+ 1·55
62	101	103·06	101·14	+ 1·92	92	68	94·45	98·53	− 4·08
63	103	101·98	100·97	+ 1·01	93	68	100·00	98·63	+ 1·37
64	105	101·94	100·80	+ 1·14	94	63	92·65	98·75	− 6·10
65	101	96·19	100·63	− 4·44	95	62	98·41	98·89	− 0·48
66	102	100·99	100·46	+ 0·53	96	61	98·39	99·05	− 0·66
67	100	98·04	100·29	− 2·25	97	62	101·64	99·23	+ 2·41
68	99	99·00	100·13	− 1·13	98	64	103·22	99·43	+ 3·79
69	98	99·00	99·97	− 0·97	99	68	106·25	99·65	+ 6·60
70	96	97·96	99·81	− 1·85	1900	75	110·29	99·89	+10·40
71	100	104·17	99·65	+ 4·52	01	70	93·34	100·16	− 6·82
72	109	109·00	99·50	+ 9·50	02	69	98·57	100·45	− 1·88
73	111	101·83	99·36	+ 2·47	03	69	100·00	100·76	− 0·76
74	102	91·89	99·22	− 7·33	04	70	101·45	101·11	+ 0·34
75	96	94·12	99·09	− 4·97	05	72	102·86	101·47	+ 1·39
76	92	98·96	98·97	− 0·01	06	77	106·94	101·86	+ 5·08
77	94	98·95	98·86	+ 0·06	07	80	103·90	102·28	+ 1·62
78	87	92·55	98·75	− 6·20	08	73	91·25	102·73	−11·48
79	83	95·40	98·65	− 3·25	09	74	101·37	103·20	− 1·83
80	88	106·20	98·57	+ 7·45	10	78	105·41	103·70	+ 1·71

Cubic Parabola:

$$y = 102{\cdot}978248 - 0{\cdot}119285x - 0{\cdot}0040386x^2 + 0{\cdot}0001038x^3.$$

Standard Deviation from Cubic Parabola = ± 5·129.

Regression Line:

$$y = a + bx = 100{\cdot}773792 - 0{\cdot}019944x.$$

TABLE 4.

See Chart V, Graph 9.

Commodity Prices. (Sauerbeck's Index.)
1850 100.

Year.	(1) Sauerbeck's Price-Index.	(2) 7-Year moving average.	(3) Deviations of data, Col. 1, from moving average.	Year.	(1) Sauerbeck's Price-Index.	(2) 7-Year moving average.	(3) Deviations of data, Col. 1, from moving average.
1848	101			1882	109	105·43	+ 3·57
49	96			83	106	102·86	+ 3·14
50	100			84	97	99·14	2·14
51	97	107·14	− 10·14	85	94	96·43	2·43
52	101	111·43	− 10·43	86	90	94·29	4·29
53	123	116·43	+ 6·57	87	88	92·57	4·57
54	132	121·57	+ 10·43	88	91	92·14	1·14
55	131	124·57	+ 6·43	89	94	91·29	+ 2·71
56	131	128·28	+ 2·72	90	94	91·00	+ 3·00
57	136	129·28	+ 6·72	91	94	90·14	+ 3·86
58	118	128·86	− 10·86	92	88	88·71	0·71
59	127	128·86	− 1·86	93	88	86·57	+ 1·43
60	130	129·28	+ 0·72	94	82	84·71	2·71
61	129	129·28	− 0·28	95	81	83·14	2·14
62	131	131·14	0·14	96	79	83·14	4·14
63	134	131·86	+ 2·14	97	81	84·42	3·42
64	136	131·86	+ 4·14	98	83	85·71	2·71
65	131	131·86	− 0·86	99	88	87·00	+ 1·00
66	132	131·28	+ 0·72	1900	97	88·57	+ 8·43
67	130	130·00	0	01	91	90·00	+ 1·00
68	129	129·14	− 0·14	02	90	91·57	1·57
69	127	130·71	− 3·71	03	90	93·28	3·28
70	125	132·42	− 7·42	04	91	94·28	3·28
71	130	132·71	2·71	05	94	94·86	0·86
72	142	132·14	+ 9·86	06	100	95·71	+ 4·29
73	144	131·57	+ 12·43	07	104	97·57	+ 6·43
74	132	131·14	+ 0·86	08	95	99·42	4·42
75	125	128·71	2·71	09	96	101·71	5·71
76	123	123·85	0·85	10	103	103·14	0·14
77	122	119·57	+ 2·43	11	104	103·86	+ 0·14
78	113	116·43	− 3·43	12	110		
79	108	114·14	6·14	13	110		
80	114	111·71	+ 2·29	14	109		
81	110	108·14	+ 1·86				

Standard Deviation = ± 4·737.

To compare the fit of the 7-years moving average to the actual data the following checks are applied:

Sum of actual data, Column 1	6675
,, Ordinates of 7-years moving average, Column 2	6678·03
Difference ...	3·03
Sum of — Deviations, Column 3	− 111·34
,, + ,, ,, ...	+ 109·32
Difference ...	2·02

TABLE 5. See Chart VI, Graph 11.

Sauerbeck's Price-Index, base 1850 = 100. From the Interim Report of the Gold Delegation of the Financial Committee, League of Nations, No. C. 375, M. 161. 1930. II. Annex XI. Table B, Column 4, p. 82. 1851–1911.

Year.	(1) Sauerbeck's Price-Index.	(2) Ordinates $y = a + bx + cx^2 + dx^3$.	(3) Deviations from $y = a + bx + cx^2 + dx^3$.	Year.	(1) Sauerbeck's Price-Index.	(2) Ordinates $y = a + bx + cx^2 + dx^3$.	(3) Deviations from $y = a + bx + cx^2 + dx^3$.
1851	97	107·18	−10·18	1882	109	107·43	+ 1·57
52	101	111·61	−10·61	83	106	105·23	+ 0·77
53	123	115·59	+ 7·41	84	97	103·06	− 6·06
54	132	119·14	+12·86	85	94	100·94	− 6·94
55	131	122·29	+ 8·71	86	90	98·87	− 8·87
56	131	125·04	+ 5·96	87	88	96·88	− 8·88
57	136	127·41	+ 8·59	88	91	94·98	− 3·98
58	118	129·42	−11·42	89	94	93·19	+ 0·81
59	127	131·08	− 4·08	90	94	91·51	+ 2·49
60	130	132·40	− 2·40	91	94	89·97	+ 4·03
61	129	133·40	− 4·40	92	88	88·58	− 0·58
62	131	134·10	− 3·10	93	88	87·36	+ 0·84
63	134	134·50	− 0·50	94	82	86·31	− 4·31
64	136	134·64	+ 1·36	95	81	85·46	− 4·46
65	131	134·51	− 3·51	96	79	84·83	− 5·83
66	132	134·14	− 2·14	97	81	84·42	− 3·42
67	130	133·54	− 3·54	98	83	84·24	− 1·24
68	129	132·73	− 3·73	99	88	84·33	+ 3·67
69	127	131·72	− 4·72	1900	97	84·69	+12·31
70	125	130·53	− 5·53	01	91	85·33	+ 5·67
71	130	129·16	+ 0·84	02	90	86·28	+ 3·72
72	142	127·65	+14·35	03	90	87·54	+ 2·46
73	144	126·00	+18·00	04	91	89·14	+ 1·86
74	132	124·22	+ 7·78	05	94	91·08	+ 2·92
75	125	122·34	+ 2·66	06	100	93·38	+ 6·62
76	123	120·36	+ 2·64	07	104	96·08	+ 7·92
77	122	118·31	+ 3·69	08	95	99·14	− 4·14
78	113	116·20	− 3·20	09	96	102·62	− 6·62
79	108	114·04	− 6·04	10	103	106·53	− 3·53
80	114	111·84	+ 2·16	11	104	110·88	− 6·88
81	110	109·64	+ 0·36				

Cubic Parabola :

$y = 102{\cdot}2987295 + 5{\cdot}1135684x - 0{\cdot}2356405x^2 + 0{\cdot}0025265x^3.$

Standard Deviation = ± 6·272.

To compare the fit of the Cubic Parabola Curve to the actual data the following checks are applied :

Sum of actual data, Column 1 ...	=	6675
,, Ordinates, Column 2 ...	=	6675·01
Difference ...	=	0·01 which is negligible.
Sum of + Deviations, Column 3	=	+ 158·83
,, − ,, ,,	=	− 158·84
Difference ...	=	− 0·01 which is negligible.

Arithmetic Mean of actual data = 109·426.

,, ,, Ordinates = ,,

Maximum Ordinate of Cubic Parabola Curve at 1864. Height above A.M. = + 25·21.

Minimum Ordinate of Cubic Parabola Curve at 1898. Depth below A.M. = − 25·19.

The Maximum and Minimum Ordinates are equidistant from the central point at 1881.

TABLE 6.

See Chart VII, Graph 12.

Relative Stock of Gold Money.
From the Interim Report of the Gold Delegation of the Financial Committee, League of Nations, No. C. 375, M. 161. 1930. II. Annex XI. Table B, Column 3, p. 82.
(Stock of 1850 increased at 3·1 per cent. per annum.)

Year.	(1) Relative Gold.	(2) 7-Year moving average.	(3) Deviations of data, Col. 1, from moving average.	Year.	(1) Relative Gold.	(2) 7-Year moving average.	(3) Deviations of data, Col. 1, from moving average.
1848	97			1882	107	107·28	− 0·28
49	99			83	105	105·00	0
50	100			84	102	102·86	− 0·86
51	103	106·57	− 3·57	85	100	100·86	− 0·86
52	109	110·71	− 1·71	86	99	99·00	0
53	117	115·28	+ 1·72	87	97	97·28	− 0·28
54	121	120·28	+ 0·72	88	96	95·71	+ 0·29
55	126	125·14	+ 0·86	89	94	94·43	0·43
56	131	129·28	+ 1·72	90	93	93·28	0·28
57	135	132·42	+ 2·58	91	91	92·43	− 1·43
58	137	135·00	+ 2·00	92	91	91·71	− 0·71
59	138	136·86	+ 1·14	93	91	91·28	− 0·28
60	139	137·71	+ 1·29	94	91	91·14	− 0·14
61	139	137·71	+ 1·29	95	91	91·43	− 0·43
62	139	137·43	+ 1·57	96	91	91·86	− 0·86
63	137	137·00	0	97	92	92·28	− 0·28
64	135	136·28	− 1·28	98	93	92·71	+ 0·29
65	135	135·57	− 0·57	99	94	93·14	+ 0·86
66	135	134·71	+ 0·29	1900	94	93·71	+ 0·29
67	134	134·00	0	01	94	94·14	− 0·14
68	134	133·28	+ 0·72	02	94	94·71	− 0·71
69	133	132·43	+ 0·57	03	95	95·14	− 0·14
70	132	131·28	+ 0·72	04	95	95·71	0·71
71	130	129·86	+ 0·14	05	97	96·57	+ 0·43
72	129	128·14	+ 0·86	06	97	97·57	− 0·57
73	127	126·28	+ 0·72	07	98	98·43	0·43
74	124	124·43	− 0·43	08	100	99·29	+ 0·71
75	122	122·71	− 0·71	09	101	99·85	+ 1·15
76	120	120·71	− 0·71	10	101	100·43	+ 0·57
77	119	118·57	+ 0·43	11	101	101·00	0
78	118	116·57	+ 1·43	12	101		
79	115	114·43	+ 0·57	13	101		
80	112	112·28	− 0·28	14	102		
81	110	109·86	+ 0·14				

Standard Deviation = ± 0·9882.

To compare the fit of the 7-years moving average to the actual data the following checks are applied:

Sum of the actual data, Column 1	=	6820
„ Ordinates of 7-years moving average, Column 2	=	6812·98
Difference ...	=	7·02
Sum of + Deviations, Column 3	=	+ 26·07
„ − „ „	=	− 19·05
Difference ...	=	+ 7·02

TABLE 7. See Chart VIII, Graph 14.

Relative Stock of Gold Money. From the Interim Report of the Gold Delegation of the Financial Committee, League of Nations, No. C. 375, M. 161. 1930. II. Annex XI. Table B, Column 3, p. 82. (Stock of 1850 increased at 3·1 per cent. per annum.) 1851–1911.

Year.	(1) Relative Gold.	(2) Ordinates $y = a + bx + cx^2 + dx^3$.	(3) Deviations from $y = a + bx + cx^2 + dx^3$.	Year.	(1) Relative Gold.	(2) Ordinates $y = a + bx + cx^2 + dx^3$.	(3) Deviations from $y = a + bx + cx^2 + dx^3$.
1851	103	115·92	−12·92	1882	107	110·16	− 3·16
52	109	119·01	−10·01	83	105	108·33	− 3·33
53	117	121·77	− 4·77	84	102	106·53	− 4·53
54	121	124·22	− 3·22	85	100	104·76	− 4·76
55	126	126·37	− 0·37	86	99	103·03	− 4·03
56	131	128·22	+ 2·78	87	97	101·36	− 4·36
57	135	129·78	+ 5·22	88	96	99·76	− 3·76
58	137	131·08	+ 5·92	89	94	98·23	− 4·23
59	138	132·12	+ 5·88	90	93	96·79	− 3·79
60	139	132·91	+ 6·09	91	91	95·45	− 4·45
61	139	133·46	+ 5·54	92	91	94·23	− 3·23
62	139	133·79	+ 5·21	93	91	93·12	− 2·12
63	137	133·90	+ 3·10	94	91	92·15	− 1·15
64	135	133·80	+ 1·20	95	91	91·32	− 0·32
65	135	133·52	+ 1·48	96	91	90·65	+ 0·35
66	135	133·05	+ 1·95	97	92	90·15	+ 1·85
67	134	132·42	+ 1·58	98	93	89·82	+ 3·18
68	134	131·63	+ 2·37	99	94	89·69	+ 4·31
69	133	130·68	+ 2·32	1900	94	89·75	+ 4·25
70	132	129·61	+ 2·39	01	94	90·03	+ 3·97
71	130	128·40	+ 1·60	02	94	90·54	+ 3·46
72	129	127·09	+ 1·91	03	95	91·27	+ 3·73
73	127	125·67	+ 1·33	04	95	92·26	+ 2·74
74	124	124·16	− 0·16	05	97	93·50	+ 3·50
75	122	122·57	− 0·57	06	97	95·00	+ 2·00
76	120	120·91	− 0·91	07	98	96·79	+ 1·21
77	119	119·20	− 0·20	08	100	98·87	+ 1·13
78	118	117·44	+ 0·56	09	101	101·25	− 0·25
79	115	115·64	− 0·64	10	101	103·95	− 2·95
80	112	113·82	− 1·82	11	101	106·97	− 5·97
81	110	111·99	− 1·99				

Cubic Parabola:

$y = 112{\cdot}4892131 + 3{\cdot}6024651x - 0{\cdot}1747879x^2 + 0{\cdot}0018729x^3.$

Standard Deviation = ± 3·838.

To compare the fit of the Cubic Parabola to the actual data the following checks are applied:

Sum of actual data, Column 1 ... = 6820
„ Ordinates, Column 2 ... = 6819·86

Difference ... = 0·14 which is negligible.

Sum of + Deviations, Column 3 = 94·11
„ − „ „ = − 93·97

Difference ... = 0·14 which is negligible.

Arithmetic Mean of actual data and Ordinates = 111·80328.

Maximum Ordinate of Cubic Parabola at 1863. Height above A.M. = + 22·097.

Minimum Ordinate of Cubic Parabola at 1899. Depth below A.M. = − 22·113.

The Maximum and Minimum Ordinates are equidistant from the central point at 1881.

TABLE 8. See Chart IX, Graph 15.

Relative Stock of Gold Money. From the Interim Report of the Gold Delegation of the Financial Committee, League of Nations, No. C. 375, M. 161. 1930. II. Annex XI. Table B, Column 3, p. 82. (Stock of 1850 increased at 3·1 per cent. per annum.)

Year.	Relative Gold.	Ordinates $y = a + bx + cx^2 + dx^3$.	Deviations from $y = a + bx + cx^2 + dx^3$.	Year.	Relative Gold.	Ordinates $y = a + bx + cx^2 + dx^3$.	Deviations from $y = a + bx + cx^2 + dx^3$.
1851	103	116·39	−13·39	1882	107	110·38	− 3·38
52	109	119·37	−10·37	83	105	108·59	− 3·59
53	117	122·02	− 5·02	84	102	106·81	− 4·81
54	121	124·38	− 3·38	85	100	105·06	− 5·06
55	126	126·44	− 0 44	86	99	103·36	− 4·36
56	131	128·21	+ 2·79	87	97	101·70	− 4·70
57	135	129·72	+ 5·28	88	96	100·11	− 4·11
58	137	130·96	+ 6·04	89	94	98·58	− 4·58
59	138	131·96	+ 6 04	90	93	97·14	− 4·14
60	139	132·71	+ 6 29	91	91	95·80	− 4·80
61	139	133·23	+ 5 77	92	91	94·56	− 3·56
62	139	133·54	+ 5·46	93	91	93·43	− 2·43
63	137	133·64	+ 3·36	94	91	92·43	− 1·43
64	135	133·54	+ 1·46	95	91	91·56	− 0·56
65	135	133·25	+ 1·75	96	91	90·85	+ 0·15
66	135	132·80	+ 2·20	97	92	90 29	+ 1·71
67	134	132·17	+ 1·83	98	93	89·90	+ 3·10
68	134	131·39	+ 2·61	99	94	89·69	+ 4·31
69	133	130·47	+ 2 53	1900	94	89·67	+ 4·33
70	132	129·42	+ 2 58	01	94	89·85	+ 4·15
71	130	128·24	+ 1 76	02	94	90·24	+ 3·76
72	129	126·96	+ 2 04	03	95	90·86	+ 4·14
73	127	125·57	+ 1·43	04	95	91·71	+ 3·29
74	124	124·10	− 0 10	05	97	92·80	+ 4·20
75	122	122·55	− 0 55	06	97	94·15	+ 2·85
76	120	120·93	− 0 93	07	98	95·76	+ 2·24
77	119	119·25	− 0·25	08	100	97·65	+ 2·35
78	118	117·52	+ 0 48	09	101	99·83	+ 1·17
79	115	115·76	− 0 76	10	101	102·30	- 1·30
80	112	113·98	− 1 98	11	101	105·09	4·09
81	110	112·18	− 2 18	12	101	108·19	7·19

Cubic Parabola :

$y = 113{\cdot}09442742 + 3{\cdot}46518798x - 0{\cdot}16829250x^2 + 0{\cdot}00179236x^3$.

Standard Deviation = ± 4·075.

To prove the correctness of the fit of the Cubic Parabola to the data the following checks are applied :

Sum of data ... ... = 6921·00
,, Ordinates ... ... = 6920·99

Difference ... = − 0·01 which is negligible.

Sum of + Deviations ... ... = + 103·45
,, − ,, ... = − 103·44

Difference ... = + 0·01 which is negligible.

Arithmetic Mean of data = 111·63.
,, ,, of Ordinates = ,,
Maximum Ordinate of Cubic Parabola Curve at 1863.
Minimum ,, ,, ,, ,, at 1899–1900.
Height of Maximum Ordinate above Arithmetic Mean = + 22·01.
Depth of Minimum Ordinate below ,, ,, = − 21·96.
The Maximum and Minimum Ordinates are equidistant from the central point at 1881·5.

TABLE 9. See Chart IX, Graph 16.

Sauerbeck's Price-Index, base 1850 = 100. From the Interim Report of the Gold Delegation of the Financial Committee, League of Nations, No. C. 375, M. 161. 1930. II. Annex XI. Table B, Column 4, p. 82.

Year.	(1) Sauerbeck's Price-Index.	(2) Ordinates $y = a + bx + cx^2 + dx^3$.	(3) Deviations from $y = a + bx + cx^2 + da^3$.	Year.	(1) Sauerbeck's Price-Index.	(2) Ordinates $y = a + bx + cx^2 + dx^3$.	(3) Deviations from $y = a + bx + cx^2 + dx^3$.
1851	97	107·47	−10·47	1882	109	107·56	+ 1·44
52	101	111·79	−10·79	83	106	105·38	+ 0·62
53	123	115·74	+ 7·26	84	97	103·23	− 6·23
54	132	119·24	+12·76	85	94	101·12	− 7·12
55	131	122·34	+ 8·66	86	90	99·07	− 9·07
56	131	125·04	+ 5·96	87	88	97·09	− 9·09
57	136	127·38	+ 8·62	88	91	95·19	− 4·19
58	118	129·35	−11·35	89	94	93·40	+ 0·60
59	127	130·98	− 3·98	90	94	91·72	+ 2·28
60	130	132·28	− 2·28	91	94	90·18	+ 3·82
61	129	133·26	− 4·26	92	88	88·78	− 0·78
62	131	133·95	− 2·95	93	88	87·54	+ 0·64
63	134	134·35	− 0·35	94	82	86·48	− 4·48
64	136	134·47	+ 1·53	95	81	85·61	− 4·61
65	131	134·35	− 3·35	96	79	84·94	− 5·94
66	132	133·98	− 1·98	97	81	84·50	− 3·50
67	130	133·39	− 3·39	98	83	84·29	− 1·29
68	129	132·59	− 3·59	99	88	84·33	+ 3·67
69	127	131·59	− 4·59	1900	97	84·63	+12·37
70	125	130·41	− 5·41	01	91	85·22	+ 5·78
71	130	129·07	+ 0·93	02	90	86·09	+ 3·91
72	142	127·57	+14·43	03	90	87·28	+ 2·72
73	144	125·94	+18·06	04	91	88·80	+ 2·20
74	132	124·18	+ 7·82	05	94	90·65	+ 3·35
75	125	122·32	+ 2·68	06	100	92·86	+ 7·14
76	123	120·37	+ 2·63	07	104	95·43	+ 8·57
77	122	118·34	+ 3·66	08	95	98·39	− 3·39
78	113	116·25	− 3·25	09	96	101·75	− 5·75
79	108	114·11	− 6·11	10	103	105·52	− 2·52
80	114	111·94	+ 2·06	11	104	109·72	− 5·72
81	110	109·75	+ 0·25	12	110	114·37	− 4·37

Cubic Parabola:

$y = 102{\cdot}671210 + 5{\cdot}020710x - 0{\cdot}231680x^2 - 0{\cdot}0024774x^3$.

Standard Deviation = + 6·252.

To prove the fit of the Cubic Parabola Curve to the actual data the following checks are applied:

Sum of actual data, Column 1 ...	=	6785·00
,, Ordinates, Column 2 ...	=	6784·91
Difference ...	=	+ 0·09 which is negligible.
Sum of + Deviations	=	+ 156·42
,, − ,, ...	=	− 156·15
Difference ...	=	+ 0·27 which is negligible.

Arithmetic Mean of actual data = 109·43.
,, ,, of Ordinates = ,,

Maximum Ordinate of Cubic Parabola Curve at 1864. Height above A.M. = + 25·04.

Minimum Ordinate of Cubic Parabola Curve at 1898–99. Depth below A.M. = − 25·14.

The Maximum and Minimum Ordinates are equidistant from the central point at 1881·5.

TABLE 10.

See Chart IX, Graph 17.

Unemployment in Great Britain (Trade Union Returns), 1851–1912.
From British and Foreign Trade and Industry (Second Series) (Cd. 2337) and 17th Abstract of Labour Statistics.

Note.—Persons on strike or locked out, sick or superannuated are excluded.

Year.	(1) Unemployment.	(2) Ordinates $y = a + bx + cx^2 + dx^3$.	(3) Deviations from $y = a + bx + cx^2 + dx^3$.	Year.	(1) Unemployment.	(2) Ordinates $y = a + bx + cx^2 + dx^3$.	(3) Deviations from $y = a + bx + cx^2 + dx^3$.
1851	3·9	4·73	— 0·83	1882	2·3	4·90	— 2·60
52	6·0	4·73	+ 1·27	83	2·6	4·90	— 2·30
53	1·7	4·72	— 3·02	84	8·1	4·91	+ 3·19
54	2·9	4·72	— 1·82	85	9·3	4·91	+ 4·39
55	5·4	4·72	+ 0·68	86	10·2	4·91	+ 5·29
56	4·7	4·72	— 0·02	87	7·6	4·91	+ 2·69
57	6·0	4·72	+ 1·28	88	4·9	4·90	0
58	11·9	4·72	+ 7·18	89	2·1	4·90	— 2·80
59	3·8	4·72	— 0·92	90	2·1	4·89	— 2·79
60	1·9	4·72	— 2·82	91	3·5	4·88	— 1·38
61	5·2	4·73	+ 0·47	92	6·3	4·87	+ 1·43
62	8·4	4·74	+ 3·66	93	7·5	4·86	+ 2·64
63	6·0	4·74	+ 1·26	94	6·9	4·85	+ 2·05
64	2·7	4·75	— 2·05	95	5·8	4·83	+ 0·79
65	2·1	4·76	— 2·66	96	3·3	4·82	— 1·52
66	3·3	4·77	— 1·47	97	3·3	4·80	— 1·50
67	7·4	4·78	+ 2·62	98	2·8	4·77	— 1·97
68	7·9	4·79	+ 3·11	99	2·0	4·75	— 2·75
69	6·7	4·80	+ 1·90	1900	2·5	4·72	— 2·22
70	3·9	4·81	— 0·91	01	3·3	4·69	— 1·39
71	1·6	4·82	— 3·22	02	4·0	4·66	— 0·66
72	0·9	4·83	— 3·93	03	4·7	4·63	+ 0·07
73	1·2	4·83	— 3·63	04	6·0	4·59	+ 1·41
74	1·7	4·84	— 3·14	05	5·0	4·55	+ 0·45
75	2·4	4·85	— 2·45	06	3·6	4·50	— 0·90
76	3·7	4·86	— 1·16	07	3·7	4·46	— 0·76
77	4·7	4·87	— 0·17	08	7·8	4·41	+ 3·39
78	6·8	4·88	+ 1·92	09	7·7	4·35	+ 3·35
79	11·4	4·88	+ 6·52	10	4·7	4·30	+ 0·40
80	5·5	4·89	+ 0·61	11	2·1	4·24	— 2·14
81	3·5	4·90	— 1·40	12	3·3	4·17	— 0·87

Cubic Parabola:

$$y = 4{\cdot}73966935 - 0{\cdot}00873299x + 0{\cdot}00089717x^2 - 0{\cdot}00001458x^3.$$

Standard Deviation = ± 2·523.

To prove the fit of the Cubic Parabola Curve to the actual data the following checks are applied:

Sum of actual data, Column 1 ... = 294·20
„ Ordinates, Column 2 ... = 294·17

Difference ... = 0·03 which is negligible.

Sum of + Deviations ... ... = + 64·02
„ — „ ... ... = — 64·17

Difference ... = — 0·19 which is negligible.

Arithmetic Mean of actual data = 4·745.
„ „ of Ordinates = „

TABLE 11. See Chart X, Graph 18.

Sauerbeck's Price-Index, base 1850 = 100. From the Interim Report of the Gold Delegation of the Financial Committee, League of Nations, No. C. 375, M. 161. 1930. II. Annex XI. Table B, Column 4, p. 82.

Year.	Sauer-beck's Price-Index.	Ordinates $y = a + bx + cx^2 + d \log x$.	Deviations from $y = a + bx + cx^2 + d \log x$.	Year.	Sauer-beck's Price-Index.	Ordinates $y = a + bx + cx^2 + d \log x$.	Deviations from $y = a + bx + cx^2 + d \log x$.
1851	97	81·85	+15·15	1881	110	105·93	+ 4·07
52	101	107·96	− 6·96	82	109	104·51	+ 4·49
53	123	120·84	+ 2·16	83	106	103·15	+ 2·85
54	132	128·37	+ 3·63	84	97	101·84	− 4·84
55	131	133·02	− 2·02	85	94	100·60	− 6·60
56	131	135·88	− 4·88	86	90	99·43	− 9·43
57	136	137·53	− 1·53	87	88	98·32	−10·32
58	118	138·34	−20·34	88	91	97·29	− 6·29
59	127	138·52	−11·52	89	94	96·32	− 2·32
60	130	138·23	− 8·23	90	94	95·43	− 1·43
61	129	137·57	− 8·57	91	94	94·61	− 0·61
62	131	136·63	− 5·63	92	88	93·87	− 5·87
63	134	135·48	− 1·48	93	88	93·21	− 5·21
64	136	134·16	+ 1·84	94	82	92·62	−10·62
65	131	132·70	− 1·70	95	81	92·12	−11·12
66	132	131·13	+ 0·87	96	79	91·69	−12·69
67	130	129·49	+ 0·51	97	81	91·35	−10·35
68	129	127·80	+ 1·20	98	83	91·09	− 8·09
69	127	126·06	+ 0·94	99	88	90·91	− 2·91
70	125	124·30	+ 0·70	1900	97	90·82	+ 6·18
71	130	122·53	+ 7·47	01	91	90·81	+ 0·19
72	142	120·75	+21·25	02	90	90·89	− 0·89
73	144	118·99	+25·01	03	90	91·06	− 1·06
74	132	117·23	+14·77	04	91	91·31	− 0·31
75	125	115·51	+ 9·49	05	94	91·65	+ 2·35
76	123	113·81	+ 9·19	06	100	92·08	+ 7·92
77	122	112·14	+ 9·86	07	104	92·59	+11·41
78	113	110 52	+ 2·48	08	95	93·20	+ 1·80
79	108	108·94	− 0·94	09	96	93·90	+ 2·10
80	114	107·41	+ 6·59	10	103	94·68	+ 8·32

Logarithmic Parabola:

$$y = 87{\cdot}953827 - 6{\cdot}158081x + 0{\cdot}051816x^2 + 106{\cdot}671122 \log x.$$

Standard Deviation = ± 8·207.

To prove the correctness of the fit of the Logarithmic Parabola to the data the following checks are applied:

Sum of actual data ... ... = 6571·00
„ Ordinates ... ... = 6570·97

Difference ... = 0 03 which is negligible.

Sum of + Deviations ... ... = + 184·79
„ − „ ... ... = − 184·76

Difference ... = + 0 03 which is negligible.

Arithmetic Mean of data = 109·52.
„ „ of Ordinates = „
Maximum Ordinate at 1859.
Minimum „ at 1901.
Height of Maximum Ordinate above Arithmetic Mean = + 29·00.
Depth of Minimum Ordinate below „ „ = − 18·71.
The Maximum and Minimum Ordinates are *not* equidistant from the Central Ordinate at the year 1880·5.

TABLE 12. See Chart X, Graph 19.

Relative Stock of Gold Money. From the Interim Report of the Gold Delegation of the Financial Committee, League of Nations, No. C. 375, M. 161. 1930. II. Annex XI. Table B, Column 3, p. 82. (Stock of 1850 increased at 3·1 per cent. per annum.)

Year.	Relative Stock of Gold Money.	Ordinates $y = a + bx + cx^2 + d \log x$	Deviations from $y = a + bx + cx^2 + d \log x$.	Year.	Relative Stock of Gold Money.	Ordinates $y = a + bx + cx^2 + d \log x$.	Deviations from $y = a + bx + cx^2 + d \log x$.
1851	103	85·19	+17·81	1881	110	108·22	+ 1·78
52	109	110·72	— 1·72	82	107	106·83	+ 0·17
53	117	123·30	— 6·30	83	105	105·51	— 0·51
54	121	130·64	— 9·64	84	102	104·24	— 2·24
55	126	135·16	— 9·16	85	100	103·04	— 3·04
56	131	137·92	— 6·92	86	99	101·90	— 2·90
57	135	139·51	— 4·51	87	97	100·83	— 3·83
58	137	140·26	— 3·26	88	96	99·84	— 3·84
59	138	140·41	— 2·41	89	94	98·91	— 4·91
60	139	140 09	— 1·09	90	93	98·06	— 5·06
61	139	139·42	— 0·42	91	91	97·28	— 6·28
62	139	138·48	+ 0·52	92	91	96·58	— 5·58
63	137	137·32	— 0·32	93	91	95·95	— 4·95
64	135	136·00	— 1·00	94	91	95·41	— 4·41
65	135	134·55	+ 0·45	95	91	94·94	— 3·94
66	135	133 00	+ 2·00	96	91	94·56	— 3·56
67	134	131·38	+ 2·62	97	92	94·26	— 2·26
68	134	129·70	+ 4·30	98	93	94·04	— 1·04
69	133	127·98	+ 5·02	99	94	93·90	+ 0·10
70	132	126·24	+ 5·76	1900	94	93·85	+ 0·15
71	130	124·51	+ 5·49	01	94	93·88	+ 0·12
72	129	122·75	+ 6·25	02	94	94·00	0
73	127	121·01	+ 5·99	03	95	94·20	+ 0·80
74	124	119·29	+ 4·71	04	95	94·50	+ 0·50
75	122	117·59	+ 4·41	05	97	94·87	+ 2·13
76	120	115·92	+ 4·08	06	97	95·34	+ 1·66
77	119	114·29	+ 4·71	07	98	95·90	+ 2·10
78	118	112·70	+ 5·30	08	100	96·55	+ 3·45
79	115	111·16	+ 3·84	09	101	97·28	+ 3·72
80	112	109·66	+ 2 34	10	101	98·11	+ 2·89

Logarithmic Parabola :

$y = 91{\cdot}216434 - 6{\cdot}079233x + 0{\cdot}051615x^2 + 104{\cdot}507890 \log x.$

Standard Deviation = ± 4·558.

To prove the correctness of the fit of the Logarithmic Parabola to the data the following checks are applied :

Sum of actual data	=	6719·00
,, Ordinates	=	6718·93
Difference ...	=	0·07 which is negligible.
Sum of + Deviations	=	+ 105·17
,, — ,, ...	=	— 105·10
Difference ...	=	+ 0·07 which is negligible.

Arithmetic Mean of data = 111·98.
,, ,, of Ordinates = ,,
Maximum Ordinate at 1859.
Minimum ,, at 1900.
Height of Maximum Ordinate above Arithmetic Mean = + 28·43.
Depth of Minimum Ordinate below ,, ,, = — 18·13.

The Maximum and Minimum Ordinates are *not* equidistant from the Central Ordinate at the year 1880·5.

TABLE 13.

See Chart X, Graph 20.

Unemployment in Great Britain (Trade Union Returns), 1851–1910.
From British and Foreign Trade and Industry (Second Series) (Cd. 2337) and 17th Abstract of Labour Statistics.
Note.—Persons on strike or locked out, sick or superannuated are excluded.

Year.	(1) Unemployment.	(2) Ordinates $y = a + bx + cx^2 + d \log x$.	(3) Deviations from $y = a + bx + cx^2 + d \log x$.	Year.	(1) Unemployment.	(2) Ordinates $y = a + bx + cx^2 + d \log x$.	(3) Deviations from $y = a + bx + cx^2 + d \log x$.
1851	3·9	3·95	− 0·05	1881	3·5	4·74	− 1·24
52	6·0	4·37	+ 1·63	82	2·3	4·74	− 2·44
53	1·7	4·59	− 2·89	83	2·6	4·73	− 2·13
54	2·9	4·72	− 1·82	84	8·1	4·73	+ 3·37
55	5·4	4·81	+ 0·59	85	9·3	4·72	+ 4·58
56	4·7	4·87	− 0·17	86	10·2	4·72	+ 5·48
57	6·0	4·90	+ 1·10	87	7·6	4·72	+ 2·88
58	11·9	4·93	+ 6·97	88	4·9	4·72	+ 0·18
59	3·8	4·94	− 1·14	89	2·1	4·72	− 2·62
60	1·9	4·95	− 3·05	90	2·1	4·73	− 2·63
61	5·2	4·96	+ 0·24	91	3·5	4·73	− 1·23
62	8·4	4·95	+ 3·45	92	6·3	4·73	+ 1·57
63	6·0	4·95	+ 1·05	93	7·5	4·74	+ 2·76
64	2·7	4·94	− 2·24	94	6·9	4·75	+ 2·15
65	2·1	4·93	− 2·83	95	5·8	4·76	+ 1·04
66	3·3	4·92	− 1·62	96	3·3	4·77	− 1·47
67	7·4	4·91	+ 2·49	97	3·3	4·78	− 1·48
68	7·9	4·90	+ 3·00	98	2·8	4·80	− 2·00
69	6·7	4·88	+ 1·82	99	2·0	4·81	− 2·81
70	3·9	4·87	− 0·97	1900	2·5	4·83	− 2·33
71	1·6	4·86	− 3·26	01	3·3	4·85	− 1·55
72	0·9	4·84	− 3·94	02	4·0	4·87	− 0·87
73	1·2	4·83	− 3·63	03	4·7	4·89	− 0·19
74	1·7	4·82	− 3·12	04	6·0	4·91	+ 1·09
75	2·4	4·80	− 2·40	05	5·0	4·94	+ 0·06
76	3·7	4·79	− 1·09	06	3·6	4·96	− 1·36
77	4·7	4·78	− 0·08	07	3·7	4·99	− 1·29
78	6·8	4·77	+ 2·03	08	7·8	5·02	+ 2·78
79	11·4	4·76	+ 6·64	09	7·7	5·05	+ 2·65
80	5·5	4·75	+ 0·75	10	4·7	5·09	− 0·39

Logarithmic Parabola :

$y = 4{\cdot}029915 - 0{\cdot}086448x + 0{\cdot}000895x^2 + 1{\cdot}698543 \log x$.

Standard Deviation = ± 2·814.

To compare the fit of the Logarithmic Parabola to the data the following checks are applied :

Sum of actual data, Column 1 ... = 288·80
" Ordinates, Column 2 ... = 288·78

Difference ... = 0·02 which is negligible.

Sum of + Deviations, Column 3 = + 62·32
" − " " = − 62·33

Difference ... = − 0·01 which is negligible.

Arithmetic Mean of data = 4·813.
" " of Ordinates = "

TABLE 14.

See Chart XII, Graph 23.

Relative Stock of Gold Money.
From the Interim Report of the Gold Delegation of the Financial Committee, League of Nations, No. C. 375, M. 161. 1930. II. Annex XI. Table B, Column 3, p. 82.

Three-Year Intervals.	Data averaged at Three-Year Intervals.	Ordinates $y = a + bx + cx^2 + dx^3$.	Deviations from $y = a + bx + cx^2 + dx^3$.	Three-Year Intervals.	Data averaged at Three-Year Intervals.	Ordinates $y = a + bx + cx^2 + dx^3$.	Deviations from $y = a + bx + cx^2 + dx^3$.
1850–52	104·00	110·86	– 6·86	1883–85	102·33	106·41	– 4·08
53–55	121·33	121·46	– 0·13	86–88	97·33	100·67	– 3·34
56–58	134·33	128·77	+ 5·56	89–91	92·67	95·60	– 2·93
59–61	138·67	133·17	+ 5·50	92–94	91·00	91·54	– 0·54
62–64	137·00	135·02	+ 1·98	95–97	91·33	88·86	+ 2·47
65–67	134·67	134·67	0	98–00	93·67	87·91	+ 5·76
68–70	133·00	132·47	+ 0·53	1901–03	94·33	89·05	+ 5·28
71–73	128·67	128·80	– 0·13	04–06	96·33	92·63	+ 3·70
74–76	122·00	124·00	– 2·00	07–09	99·67	99·02	+ 0·65
77–79	117·33	118·43	– 1·10	10–12	101·00	108·57	– 7·57
80–82	109·67	112·44	– 2·77				

Cubic Parabola:

$y = 96{\cdot}6499476 + 16{\cdot}1465671x - 1{\cdot}9923993x^2 + 0{\cdot}595502x^3$.

Standard Deviation = ± 3·782.

To prove the correctness of the fit of the Cubic Parabola to the data the following checks are applied:

Sum of actual data ... ... = 2340·33
" Ordinates ... ... = 2340·35

Difference ... = 0·02 which is negligible.

Sum of + Deviations ... ... = + 31·43
" – " ... ... = – 31·45

Difference ... = – 0·02 which is negligible.

Arithmetic Mean of data = 111·45.
" " of Ordinates = "
Height of Maximum Ordinate above Arithmetic Mean = + 23·57.
Depth of Minimum Ordinate below " " = – 25·54.
Maximum Ordinate at 3-Years Interval 1862–64.
Minimum " " " 1898–00.

The Maximum and Minimum Ordinates are equidistant from the Central Ordinate at the 3-Years Interval 1880–82.

TABLE 15.

See Chart XII, Graph 24.

Sauerbeck's Price-Index, base 1850 = 100.
From the Interim Report of the Gold Delegation of the Financial Committee, League of Nations, No. C. 375, M. 161. 1930. II. Annex XI. Table B, Column 4, p. 82.

Three-Year Intervals.	Data averaged at Three-Year Intervals.	Ordinates $y = a + bx + cx^2 + dx^3$.	Deviations from $y = a + bx + cx^2 + dx^3$.	Three-Year Intervals.	Data averaged at Three-Year Intervals.	Ordinates $y = a + bx + cx^2 + dx^3$.	Deviations from $y = a + bx + cx^2 + dx^3$.
1850–52	99·33	106 26	− 6 93	1883–85	99·00	103·25	− 4·25
53–55	128·67	118·50	+10·17	86–88	89·67	97·01	− 7·34
56–58	128·33	127·01	+ 1·32	89–91	94·00	91·58	+ 2·42
59–61	128·67	132·19	− 3·52	92–94	86 00	87·34	− 1·34
62–64	133·67	134·45	− 0·78	95–97	80·33	84·73	− 4·40
65–67	131·00	134·21	− 3·21	98–00	89·33	84·15	+ 5·18
68–70	127·00	131·87	− 4·87	1901–03	90·33	86·00	+ 4·33
71–73	138·67	127·86	+10·81	04–06	95 00	90·71	+ 4·29
74–76	126·67	122·57	+ 4·10	07–09	98·33	98·69	− 0·36
77–79	114·33	116 44	− 2·11	10–12	105·67	110·35	− 4·68
80–82	111·00	109 86	+ 1·14				

Cubic Parabola·
$y = 89{\cdot}8581428 + 18{\cdot}6130571x - 2{\cdot}2824465x^2 + 0{\cdot}0686938x^3$.
Standard Deviation = ± 4·998.
To prove the correctness of the fit of the Cubic Parabola to the data the following checks are applied:

Sum of actual data ... ... = 2295·00
„ Ordinates ... ... = 2295·03

Difference ... = 0·03 which is negligible.

Sum of + Deviations ... ... = + 43·76
„ − „ ... ... = − 43·79

Difference ... = − 0 03 which is negligible.

Arithmetic Mean of data = 109·28.
„ „ of Ordinates = „
Height of Maximum Ordinate above Arithmetic Mean = + 25·17.
Depth of Minimum Ordinate below „ „ = − 25·13.
Maximum Ordinate at 3-Years Interval 1862–64.
Minimum „ „ „ 1898–00.
The Maximum and Minimum Ordinates are equidistant from the Central Ordinate at the 3-Years Interval 1880–82.

TABLE 16.

See Charts XIII–XV, Graphs 26, 28–31.

Sauerbeck's Price-Index, base 1850 = 100.
From the Interim Report of the Gold Delegation of the Financial Committee, League of Nations, No. C. 375, M. 161. 1930. II. Annex XI. Table B, Column 4, p. 82.

Three-Year Intervals.	Data averaged at Three-Year Intervals.	Ordinates $y = a + bx + cx^2 + d \log x$.	Deviations from $y = a + bx + cx^2 + d \log x$.	Three-Year Intervals.	Data averaged at Three-Year Intervals.	Ordinates $y = a + bx + cx^2 + d \log x$.	Deviations from $y = a + bx + cx^2 + d \log x$.
1850–52	99·33	95·29	+ 4·04	1883–85	99·00	101·41	— 2·41
53–55	128·67	126·67	+ 2·00	86–88	89·67	97·73	— 8·06
56–58	128·33	136·55	— 8·22	89–91	94·00	94·79	— 0·79
59–61	128·67	138·34	— 9·67	92–94	86·00	92·66	— 6·66
62–64	133·67	136·26	— 2·59	95–97	80·33	91·40	—11·07
65–67	131·00	132·16	— 1·16	98–00	89·33	91·04	— 1·71
68–70	127·00	127·05	— 0·05	1901–03	90·33	91·62	— 1·29
71–73	138·67	121·53	+17·14	04–06	95·00	93·16	+ 1·84
74–76	126·67	115·97	+10·70	07–09	98·33	95·71	+ 2·62
77–79	114·33	110·65	+ 3·68	10–12	105·67	99·26	+ 6·41
80–82	111·00	105·75	+ 5·25				

Logarithmic Parabola:

$$y = 119{\cdot}8484334 - 25\ 1630386x + 0{\cdot}6065373x^2 + 181{\cdot}7812723 \log x.$$

Standard Deviation = ± 6·666.

To prove the correctness of the fit of the Logarithmic Parabola to the data the following checks are applied:

Sum of actual data ... ... = 2295·00
" Ordinates ... ... = 2295·00
Difference ... = 0·00

Sum of + Deviations ... ... = + 53·68
" — " ... ... = — 53·68
Difference ... = 0·00

Arithmetic Mean of data = 109·28.
" " of Ordinates = "
Height of Maximum Ordinate above Arithmetic Mean = + 29·06.
Depth of Minimum Ordinate below " " = — 18·24.
Maximum Ordinate at 3-Years Interval 1859–61.
Minimum " " " 1898–00.

The Maximum and Minimum Ordinates are *not* equidistant from the Central Ordinate at the 3-Years Interval 1880–82.

The Maximum Ordinate occurs at the 7th 3-Years Interval from the Central Ordinate, whereas the Minimum Ordinate occurs at the 6th 3-Years Interval from the Central Ordinate.

TABLE 17.

See Charts XIII–XV, Graphs 27–31.

Relative Stock of Gold Money.
From the Interim Report of the Gold Delegation of the Financial Committee, League of Nations, No. C. 375, M. 161. 1930. II. Annex XI. Table B, Column 3, p. 82.

Three-Year Intervals.	Data averaged at Three-Year Intervals.	Ordinates $y = a+bx + cx^2 + d \log x$.	Deviations from $y = a + bx + cx^2 + d \log x$.	Three-Year Intervals.	Data averaged at Three-Year Intervals.	Ordinates $y = a+bx + cx^2 + d \log x$.	Deviations from $y = a + bx + cx^2 + d \log x$.
1850–52	104·00	98·88	+ 5·12	1883–85	102·33	104·25	− 1·92
53–55	121·33	128·54	− 7·21	86–88	97·33	100·62	− 3·29
56–58	134·33	137·91	− 3·58	89–91	92·67	97·67	− 5·00
59–61	138·67	139·62	− 0·95	92–94	91·00	95·46	− 4·46
62–64	137·00	137·66	− 0·66	95–97	91·33	94·05	− 2·72
65–67	134·67	133·78	+ 0·89	98–00	93·67	93·47	+ 0·20
68–70	133·00	128·92	+ 4·08	1901–03	94·33	93·76	+ 0·57
71–73	128·67	123·65	+ 5·02	04–06	96·33	94·94	+ 1·39
74–76	122·00	118·34	+ 3·66	07–09	99·67	97·04	+ 2·63
77–79	117·33	113·22	+ 4·11	10–12	101·00	100·07	+ 0·93
80–82	109·67	108·48	+ 1·19				

Logarithmic Parabola:

$y = 121{\cdot}9614190 - 23{\cdot}6419557x + 0{\cdot}5620576x^2 + 171{\cdot}4739099 \log x.$

Standard Deviation = ± 3·406.

To prove the correctness of the fit of the Logarithmic Parabola to the data the following checks are applied:

Sum of actual data ... ... = 2304·33
„ Ordinates ... ... = 2304·33

Difference ... = 0·00

Sum of + Deviations ... ... = + 29·79
„ − „ ... ... = − 29·79

Difference ... = 0·00

Arithmetic Mean of data = 111·45.
„ „ of Ordinates = „
Height of Maximum Ordinate above Arithmetic Mean = + 28·17.
Depth of Minimum Ordinate below „ „ = − 17·98.
Maximum Ordinate at 3-Years Interval 1859–61.
Minimum „ „ „ 1898–00.

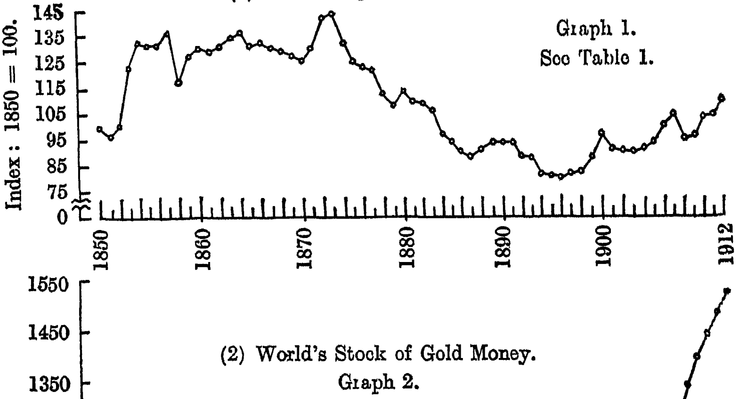
The Maximum and Minimum Ordinates are *not* equidistant from the Central Ordinate at the 3-Years Interval 1880–82.

The Maximum Ordinate occurs at the 7th 3-Years Interval from the Central Ordinate, whereas the Minimum Ordinate occurs at the 6th 3-Years Interval from the Central Ordinate.

CHART I.

Comparison of the movements in the data of:

(1) Commodity Price-Index.



(3) Unemployment in Great Britain. Graph 3. See Table 1.

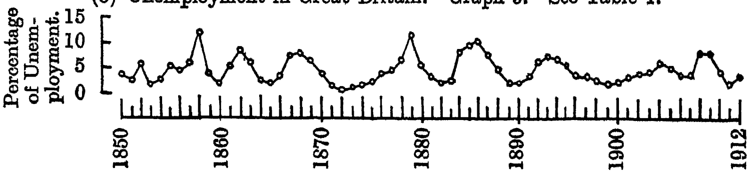


CHART II.

Comparison of the World's Stock of Gold Money with the Commodity Price-Index which suggests a symmetrical movement in both series of data during the period 1850–1912.

The Straight Lines through the data represent the Compound Interest Law derived from the data by the equation $y = ab^x$.

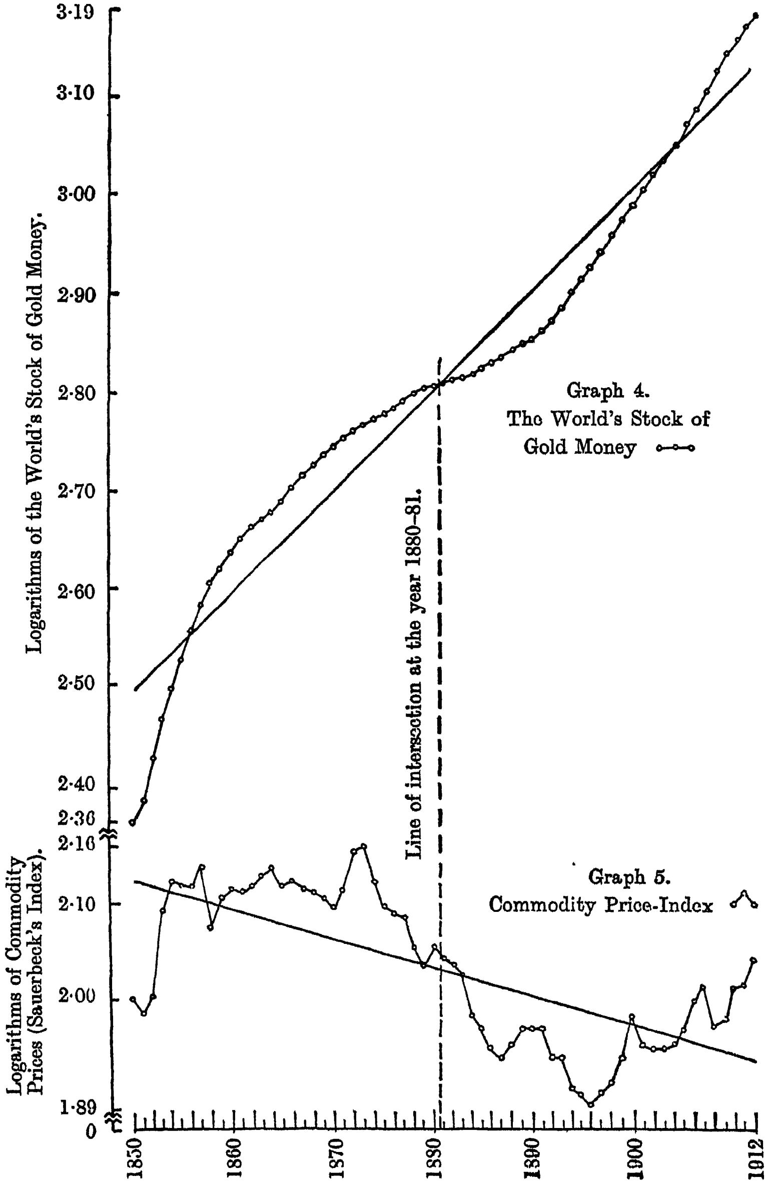


CHART III.

Comparison of the Annual Rate of Change of the World's Stock of Gold Money and the Annual Rate of Change of the Commodity Price-Index.

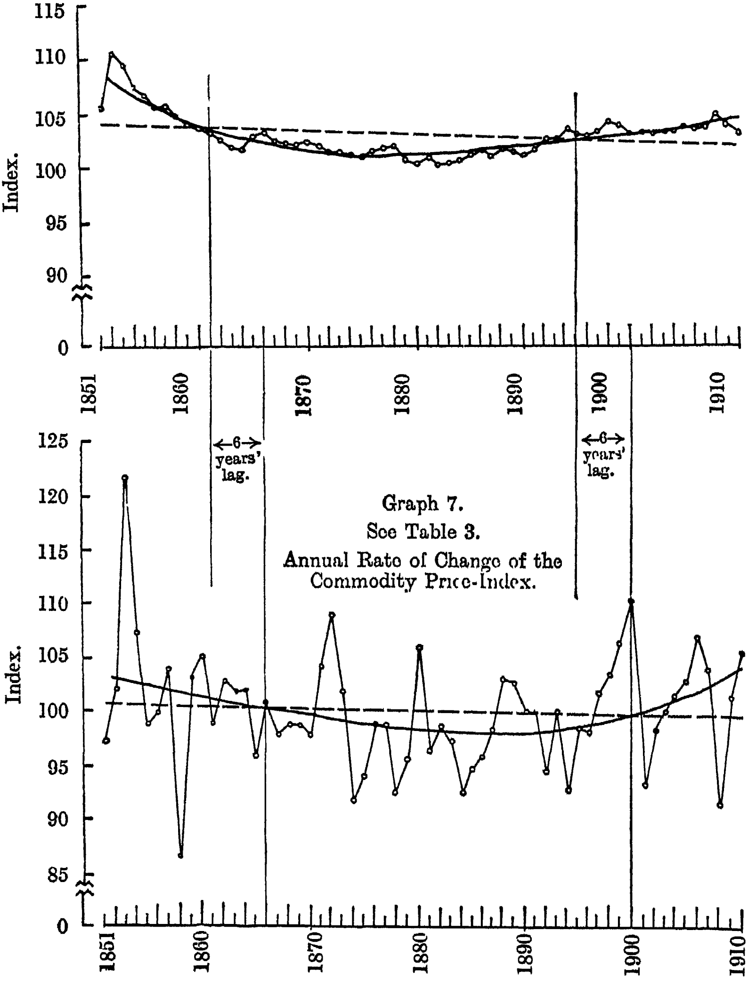
Formulæ: Straight dotted lines: $y = a + bx$.

Curved lines: $y = a + bx + cx^2 + dx^3$.

Graph 6.

See Table 2.

Annual Rate of Change of the World's Stock of Gold Money.



Graph 7.

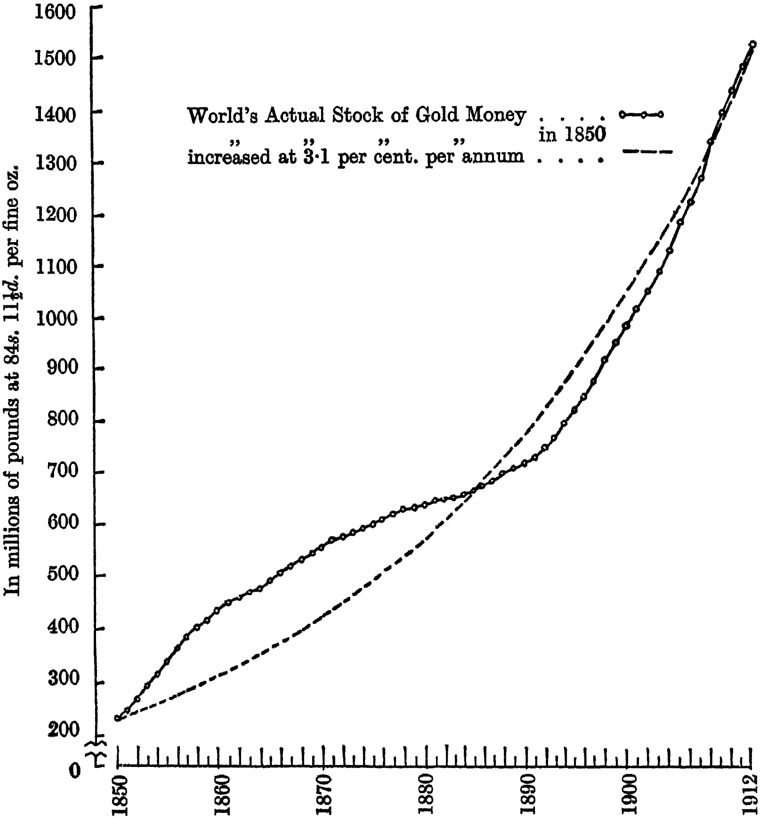
See Table 3.

Annual Rate of Change of the Commodity Price-Index.

CHART IV.

Graph 8.

Comparison of the World's Actual Stock of Gold Money, 1850–1912, with that of the Stock in 1850 increased at 3·1 per cent. per annum.



Reproduced from Graph 1.

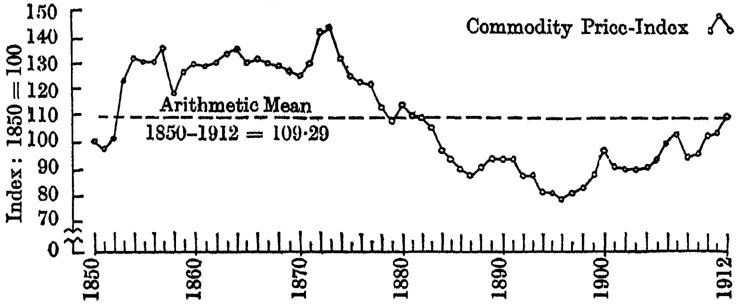
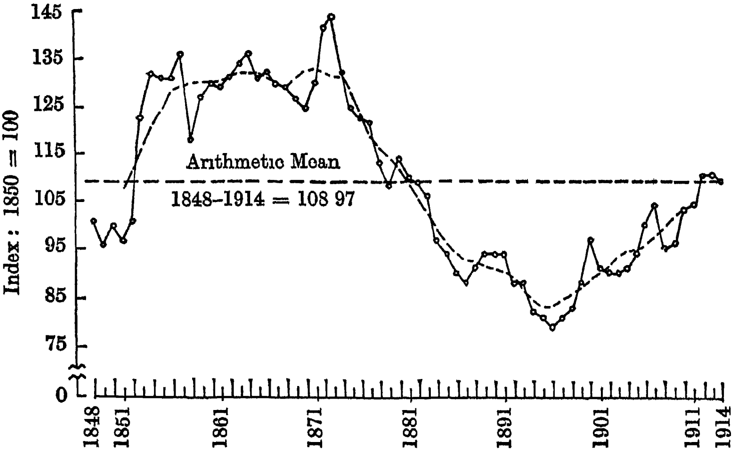


CHART V.

Graph 9.

See Table 4.

The data of the Commodity Price-Index smoothed by a 7-year moving average.



Graph 10.

Pure Sinusoid $y = \sin\theta$ fitted to the data of the Commodity Price-Index.

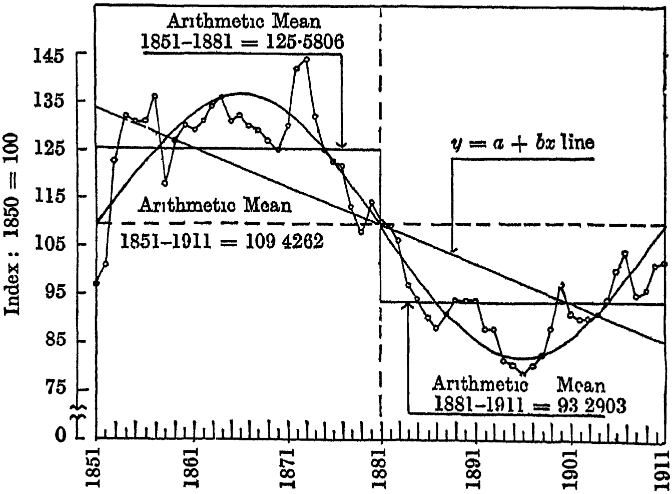
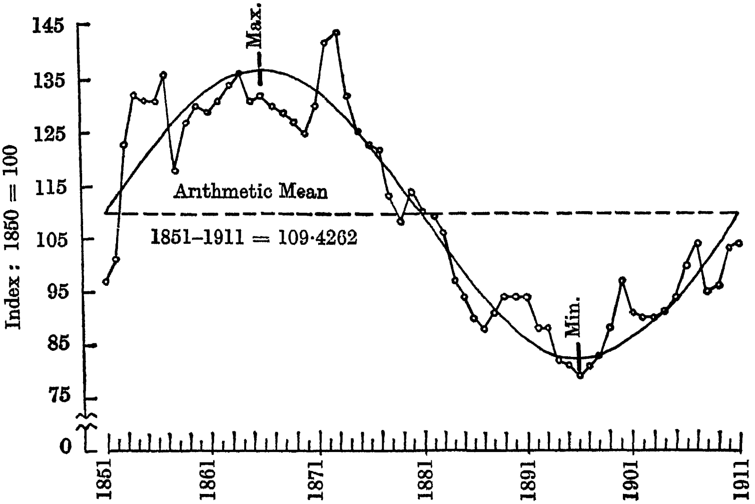


CHART VI.

Pure Sinusoid $y = \text{Sin}\ \theta$ fitted to the data of the Commodity Price-Index, reproduced from Chart V, Graph 10.



Graph 11.

See Table 5.

The data of the Commodity Price-Index analysed by the Cubic Parabola, $y = a + bx + cx^2 + dx^3$.

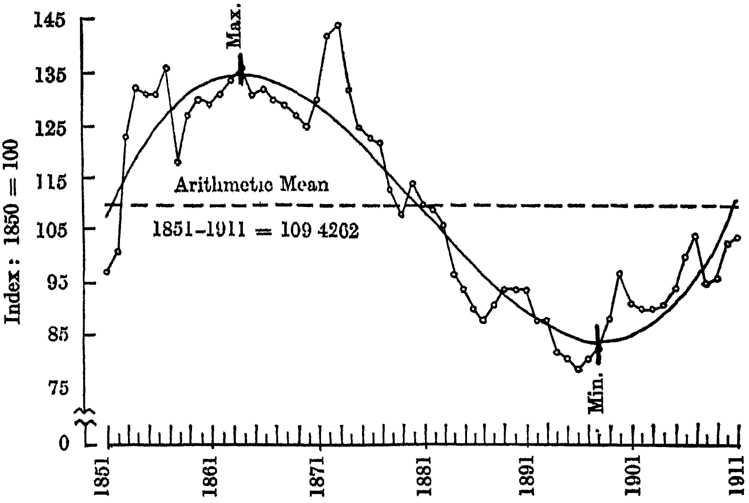
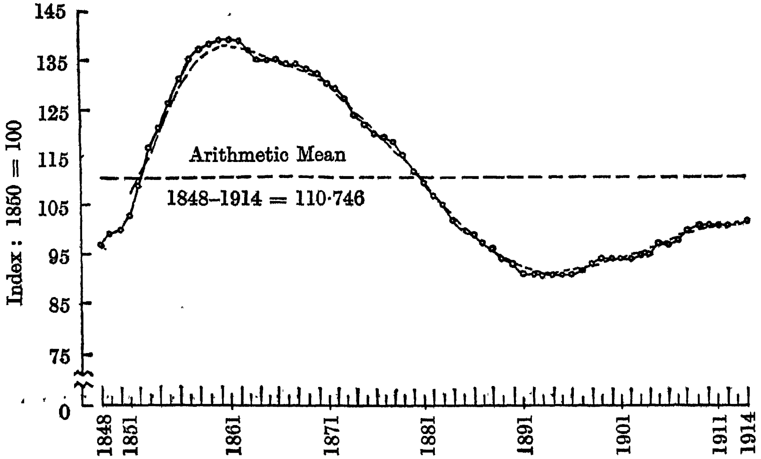


CHART VII.

Graph 12.

See Table 6.

The data of the World's Relative Stock of Gold Money smoothed by a 7-year moving average.



Graph 13.

Pure Sinusoid $y = \text{Sin}\ \theta$, fitted to the data of the World's Relative Stock of Gold Money.

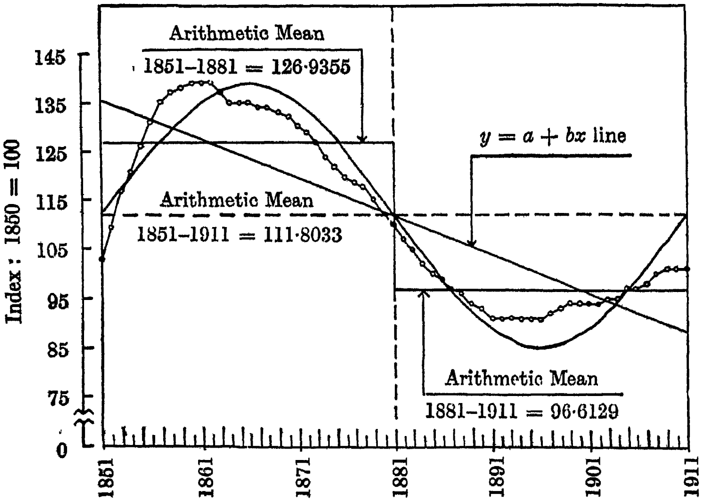
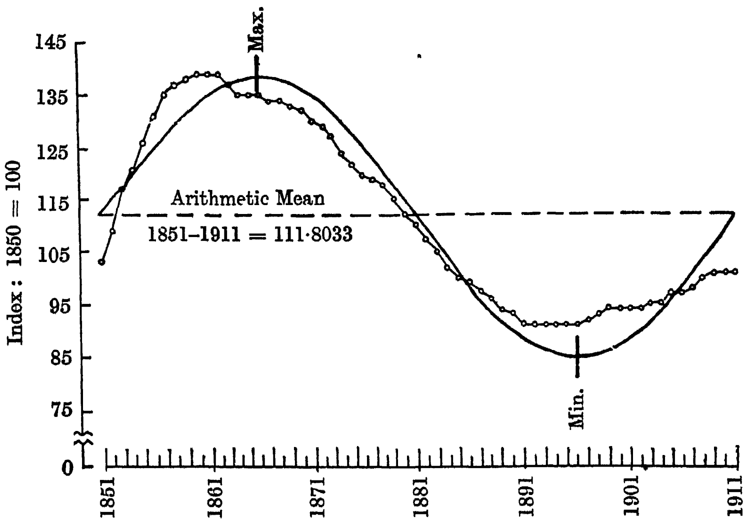


CHART VIII.

Pure Sinusoid $y = \text{Sin}\ \theta$, fitted to the data of the World's Relative Stock of Gold Money, reproduced from Chart VII, Graph 13.



Graph 14.

See Table 7.

The data of the World's Relative Stock of Gold Money analysed by the Cubic Parabola $y = a + bx + cx^2 + dx^3$.

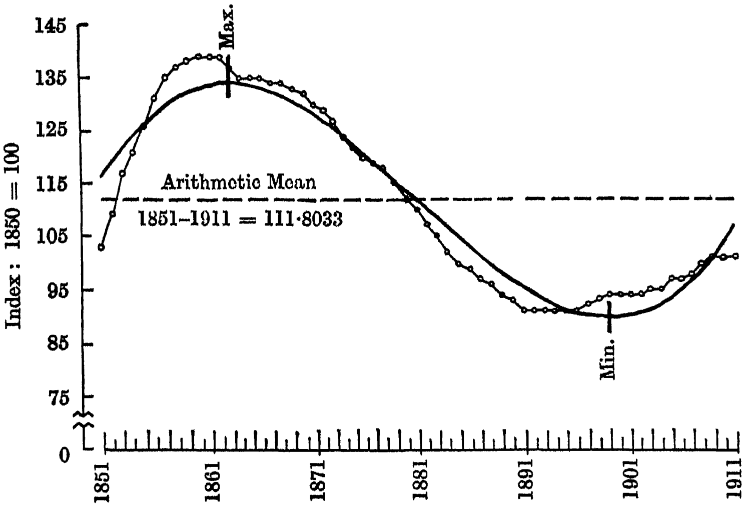
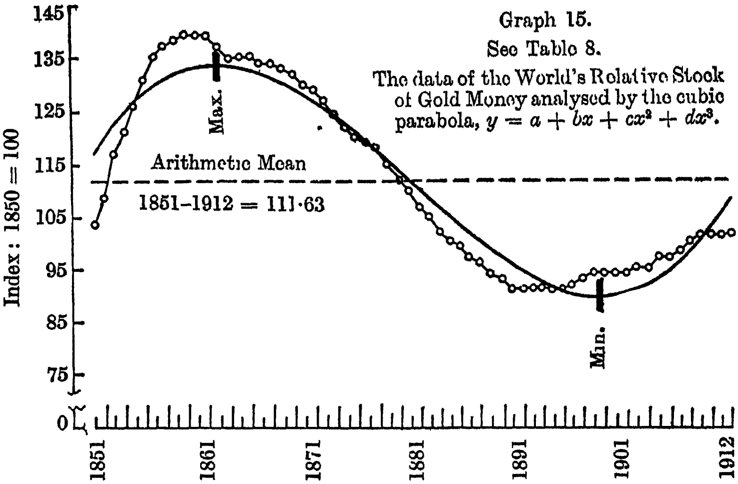
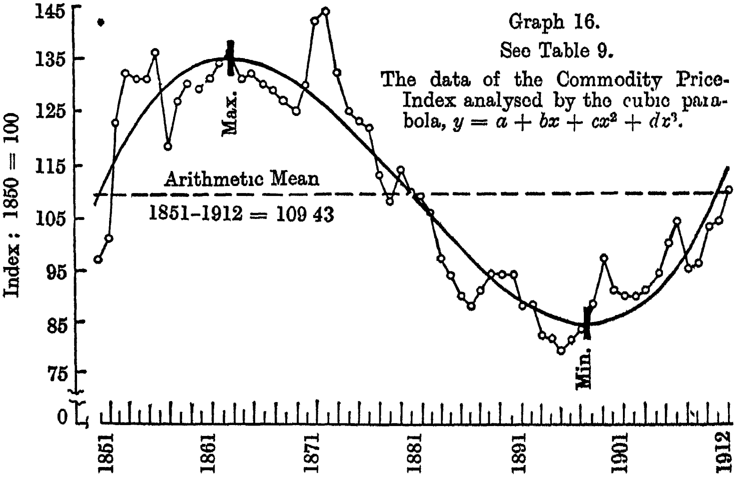


CHART IX.



Graph 15.
See Table 8.
The data of the World's Relative Stock of Gold Money analysed by the cubic parabola, $y = a + bx + cx^2 + dx^3$.



Graph 16.
See Table 9.
The data of the Commodity Price-Index analysed by the cubic parabola, $y = a + bx + cx^2 + dx^3$.

Graph 17.
See Table 10.
The data of Unemployment in Great Britain analysed by the cubic parabola, $y = a + bx + cx^2 + dx^3$.

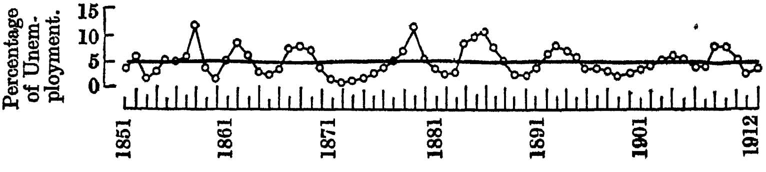
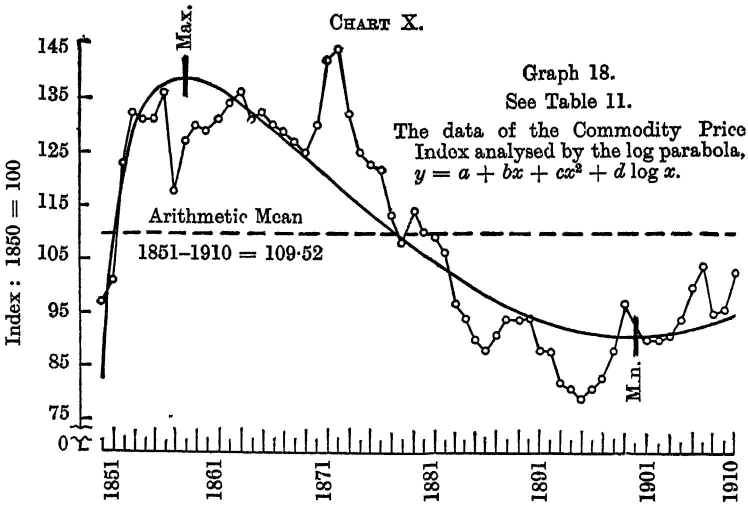
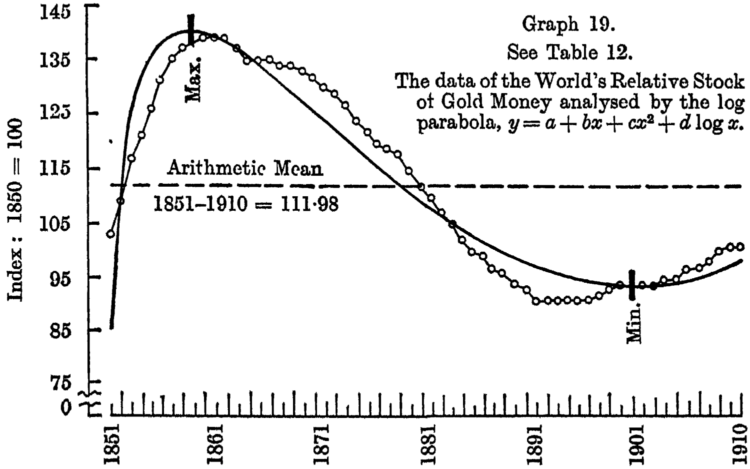


CHART X.



Graph 18.
See Table 11.
The data of the Commodity Price Index analysed by the log parabola, $y = a + bx + cx^2 + d \log x$.



Graph 19.
See Table 12.
The data of the World's Relative Stock of Gold Money analysed by the log parabola, $y = a + bx + cx^2 + d \log x$.

Graph 20.
See Table 13.
The data of Unemployment in Great Britain analysed by the log parabola, $y = a + bx + cx^2 + d \log x$.

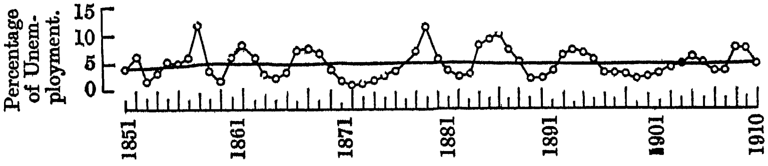
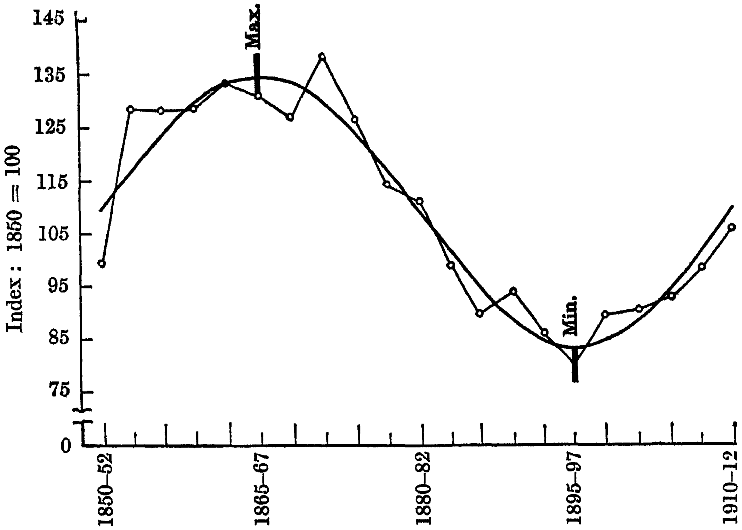


CHART XI.

Graph 21.

The Pure Sinusoid $y = \sin \theta$ fitted to the data of the Commodity Price-Index, arranged in 3-*year blocks*.



Graph 22.

The Pure Sinusoid $y = \sin \theta$ fitted to the data of the World's Relative Stock of Gold Money, arranged in 3-*year blocks*.

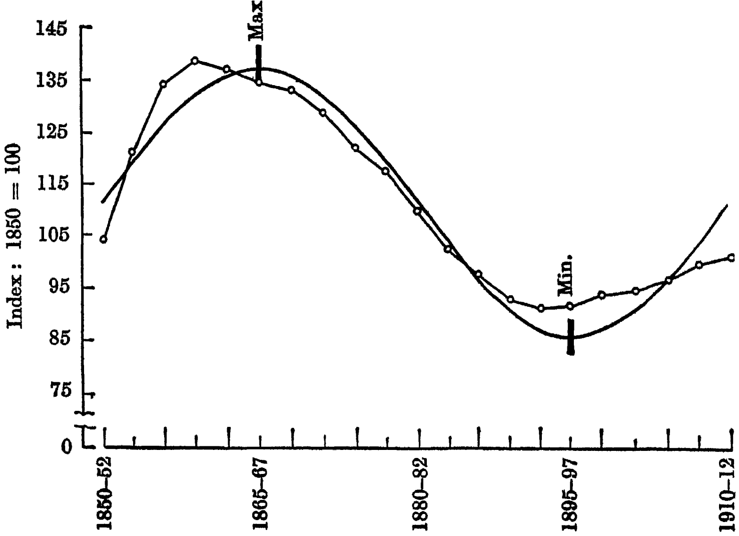
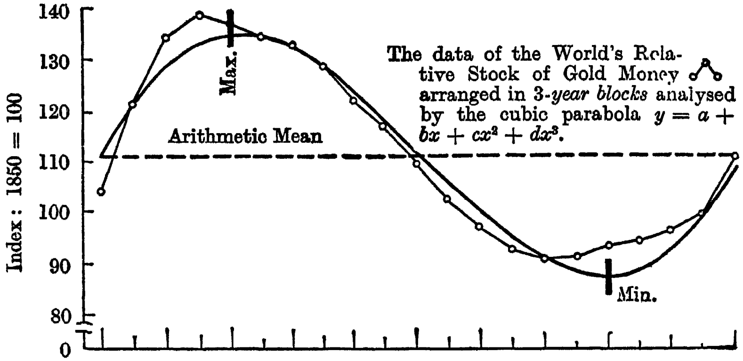


CHART XII.

Graph 23.

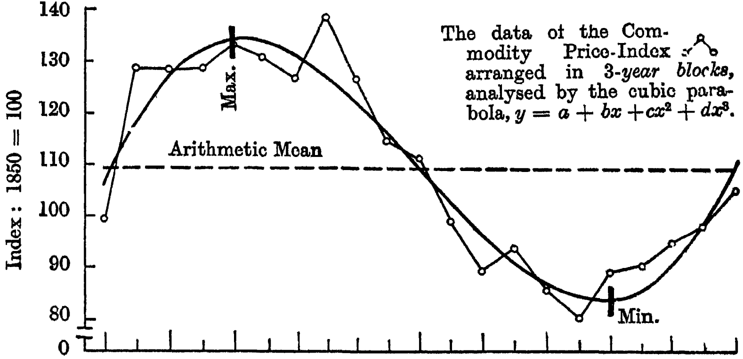
See Table 14.



The data of the World's Relative Stock of Gold Money arranged in 3-*year blocks* analysed by the cubic parabola $y = a + bx + cx^2 + dx^3$.

Graph 24.

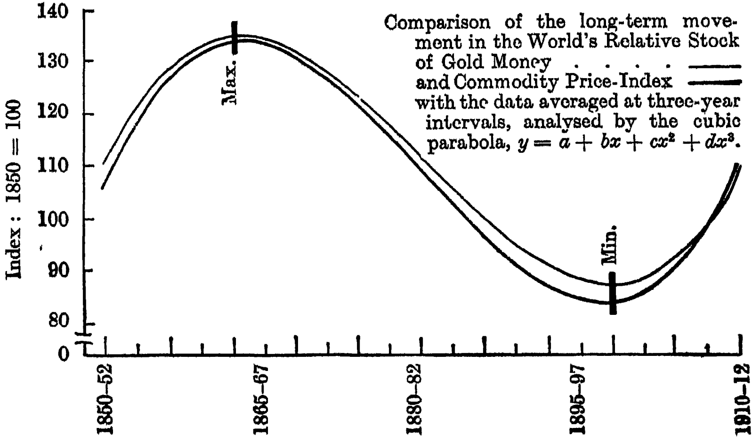
See Table 15.



The data of the Commodity Price-Index arranged in 3-*year blocks*, analysed by the cubic parabola, $y = a + bx + cx^2 + dx^3$.

Graph 25.

See Tables 14 and 15.



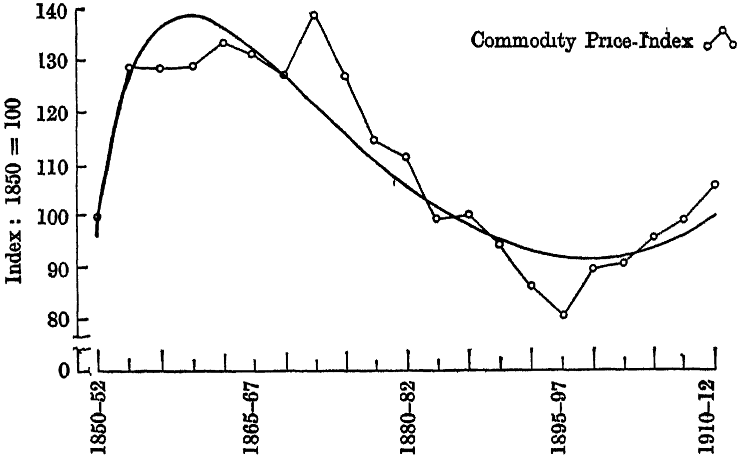
Comparison of the long-term movement in the World's Relative Stock of Gold Money . . . . . ———
and Commodity Price-Index ━━━
with the data averaged at three-year intervals, analysed by the cubic parabola, $y = a + bx + cx^2 + dx^3$.

CHART XIII.

Comparison of the World's Relative Stock of Gold Money and Commodity Prices (Sauerbeck's Index) with the data arranged in three-year blocks and the $y = \sin\theta$ movement included in both cases.

Formula for Smooth Curves: $y = a + bx + cx^2 + d \log x$.

Graph 26.
See Table 16.



Graph 27.
See Table 17.

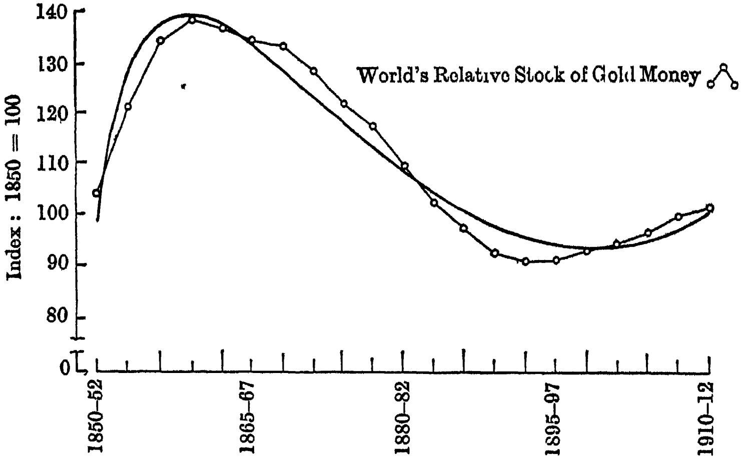
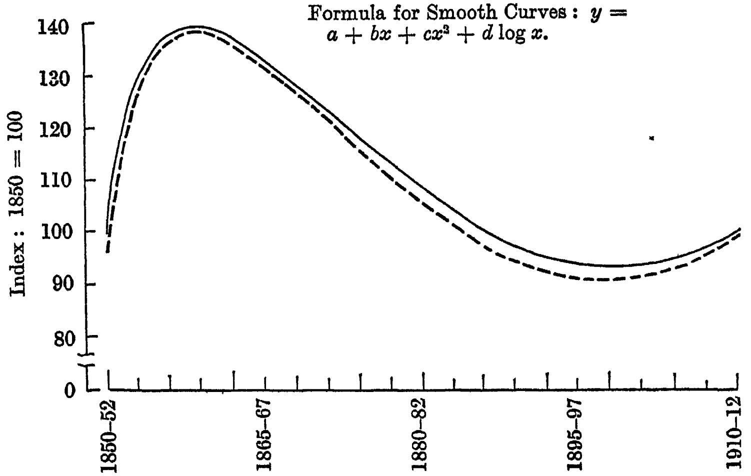


CHART XIV.

Graph 28.

See Chart XIII, Graphs 26 and 27, also Tables 16 and 17.

Comparison of the Smooth Curves of the
World's Relative Stock of Gold Money ———
and Commodity Prices (Sauerbeck's Index) - - - -
with the data arranged in three-year blocks and the
$y = \text{Sin}\ \theta$ movement included in both cases.


Formula for Smooth Curves: $y = a + bx + cx^2 + d \log x$.

Graph 29.

See Chart XIII, Graphs 26 and 27, also Tables 16 and 17.

Direct, significant, correlation, + 0·632, between the
World's Relative Stock of Gold Money . . ○—○
and Commodity Price-Index . . . . . ○- -○
with the data arranged in three-year blocks and the
$y = \text{Sin}\ \theta$ movement included in both cases.

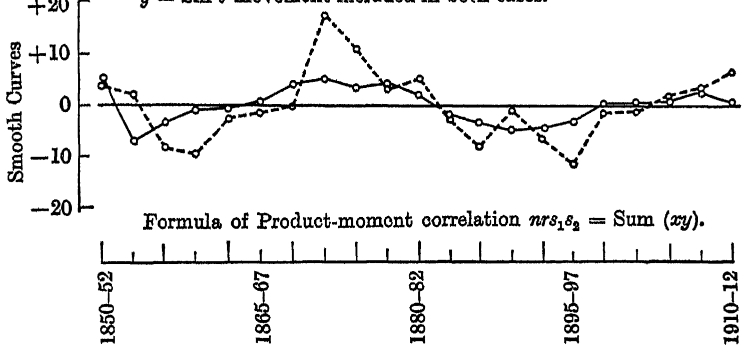

Formula of Product-moment correlation $nrs_1s_2 = \text{Sum}\ (xy)$.

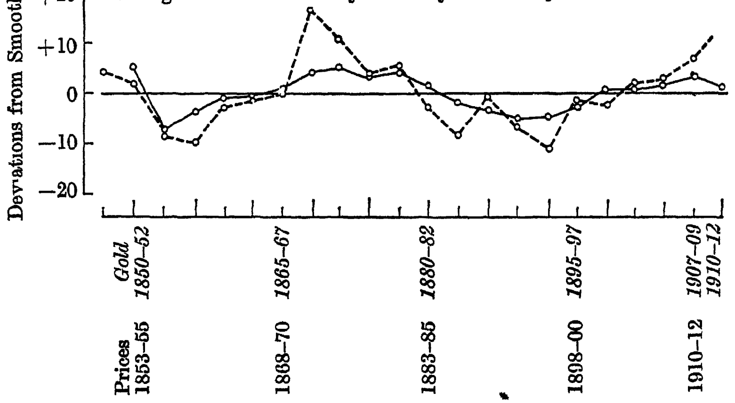
CHART XV.

Comparison of Lagged Correlations.

Graph 30.

See Chart XIII, Graphs 26 and 27, also Tables 16 and 17

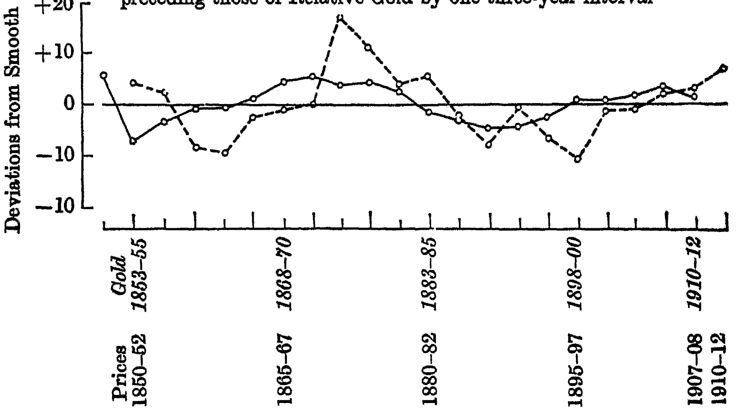
Lagged, definitely significant, correlation, + 0 858, between the
World's Relative Stock of Gold Money . . . o- -o
and Commodity Price Index . . . o—o
with the data arranged in three year blocks and the $y = \text{Sin}\ \theta$ movement included in both cases and the movements of *Relative Gold* preceding those of Commodity Prices by one three year interval.



Graph 31.

See Chart XIII, Graphs 26 and 27, also Tables 16 and 17.

Lagged, insignificant, correlation, + 0 317, between
the World's Relative Stock of Gold Money . o- -o
and Commodity Price Index . . . o—o
with the data arranged in three year blocks and the $y = \text{Sin}\ \theta$ movement included in both cases and the movements of *Commodity Prices* preceding those of Relative Gold by one three-year interval



DISCUSSION ON THE QUANTITY AND QUALITY OF OFFICIAL STATISTICAL PUBLICATIONS

Opened by PROFESSOR M. GREENWOOD, F.R.S.

[At a Meeting of the Royal Statistical Society, February 16th, 1932, the PRESIDENT, SIR J. C. STAMP, G.B.E., LL.D., D.Sc., in the Chair.]

I HAVE consented to open this discussion for three reasons. The first is that when a cause is tried before a judge and jury, a junior counsel rises first, makes a brief, colourless statement and leaves the real work of putting the issues before the Court to the Learned Leader who is to follow him. The next is that the branch of official statistics with which I am connected attracts less notice, favourable or unfavourable, in public discussion of the virtues and vices of the civil service than others, so that I am, whether as an official or an individual, less subject than some colleagues to the bias of *spretæ injuria formæ*, unless, of course, *spreta* may be translated "wholly unknown." The third, and most important, reason is that Fellows of our Society are the largest producers and consumers of official statistics in this country and it is pleasant to bring forward a subject which is peculiarly interesting to us as a society.

We do not need here any jeremiads on public expenditure to remind us that the output of official statistics has increased, and is increasing, our only doubt is as to the applicability of the third clause of Dunning's famous resolution.

The Annual Report of the Registrar-General for the year 1867 contained 204 pages of tabular matter and 100 pages of comment (adding together as comment the section signed by the Registrar-General, some descriptive summaries and Farr's "letter" to the Registrar-General). Sixty years later, the Annual Report (*Statistical Review*) contained 622 pages of tables and 146 pages of comment. In these sixty years the population increased by 83 per cent., the tabular matter in which some aspects of the fate of the population is recorded by 205 per cent.

The comment on Learning's Crabbed Text may not seem from this arithmetic to have kept pace in growth with it; in reality it has grown faster. A good deal of what I have called the comment of the report on 1867 is not comment at all, but rhetorical exhortation. "Do not leave the dirt in rookeries, in pits, in dunghills. What are municipal bodies, town councillors, aldermen, mayors, provosts good for, if they cannot by administrative measures displace rookeries by healthy habitations, supply the people with water, and with the means of 'cleanliness,' which stands proverbially 'next to godliness'? " (A. R., 1867, p. 219). I am not prepared to assert, on oath, that similar rhetoric has not been printed in *any* official report of 1927, but I am prepared to swear that nothing remotely resembling it is to be found in the Annual Report of the Registrar-General of 1927. When we turn to precise comment on the crabbed text, we note that the comment on mortality from cancer consists of just two lines:—" Cancer is a type (*i.e.* of constitutional diseases); in its different forms it was fatal in the year to 2,650 males and to 5,895 females, chiefly after the age of growth—of reproduction—was over." In the 1927 report comment on mortality from cancer occupies 8½ pages; the recorded mortality had no doubt increased by more than 500 per cent., but the comment has increased by 1000's per cent.

The position then is, that the official output both of tabular matter and of comment upon the tabular matter has increased enormously, and the question for discussion is whether this tendency ought to be checked. The critics of official statistical publications who have come my way fall into two classes. One class, let us call them Class A, does not object at all to the volume of published tabular matter, but has less sympathy with the increasing volume of comment. The other class, let us call them Class B, protests violently against the increased volume of tabular matter. In Class A one finds some accomplished statisticians; in Class B most people who take their opinions from the daily newspapers.

The case against modern official tendencies presented by members of Class A is this. It should be the guiding principle of a public department to make public its statistical data, its raw material, at the earliest possible moment and with the least amount of sophistication. It is inevitable that there should be a good deal of sophistication; one cannot, for instance, print the individual records of ages of the millions of enumerated persons, one cannot print the millions of recorded occupations; *tabulation* is necessary and tabulation is already a sophistication. But the officials should take care their tabulations are so fine that expert users of the material will not be hampered in *their* sophistications by lack of essential detail. Of course the general public, who, alas, know nothing of the science and art of statistics, expect *some* official statement of what the tabulation is all about, and it must be provided. But it should be as short and simple as possible. The officials ought not to try to skim all the scientific cream off the milk they distribute, particularly if that process means a delay of publication. Such action not only gives the officials an unfair priority with respect to scientific colleagues who do not belong to the Civil Service, but violates a fundamental rule of real scientific research. That rule is that mere authority ought not to bear down free discussion. But publication of scientific work in an official document *does* create a prejudice in favour of work so treated. The very people who declaim against the Government or the bureaucrats in general terms, often regard particular official statements with slavish awe. To adapt a well-known passage from Walter Bagehot, if you want to raise a general cheer, declaim against the folly and short-sightedness of "the Government," if you want to be regarded as a crank, if not a Bolshevist, question whether the particular inference drawn in paragraph so and so of the Report of—the reader may fill the blank with the name of any *pukka* Government office he pleases—is correct. Hence the right policy of a Government department would be to economize not on tabulation but upon comment. No doubt in mere cost of publication the tabular matter is a much greater charge upon the tax-payer than the comment, so that this policy will not appeal to the Treasury, unless restriction of comment means restriction of expert staff and saving of salaries. Repugnant as that proposal may be, it is preferable to the alternative, viz. any large saving of expenditure on tabulation at the price of leaving the official statisticians in a doubly privileged position, viz. that of publishing their conclusions before anybody else and, by *not* publishing the data from which the conclusions are drawn, making any independent expert criticism quite impossible. That is, I think, a fair summary of the arguments not of any individual but of a composite made of members of the class of expert unofficial critics.

I turn to the arguments of our old friend the average man, to Class B, and to give him his best chance (within the limitations of my preamble, *i.e.* when taking a kind of official statistics which he hardly ever reads), I suppose him to have a copy of a Registrar-General's Annual Report of recent pre-war days and to discourse to his neighbour in the train on the tabulation of "Causes of Death in Administrative Areas, 1913"—a tabulation which occupied 99 foolscap pages of that report and in more recent years has been much curtailed. I think he might express himself in some such terms as these. "It's a perfect scandal that those lazy clerks in Somerset House should waste our money printing great tables of figures. Why should our money be spent in printing that seven males died in Hambleden (Bucks) in 1913? Very sad for their families of course, but what interest has that to the public? Three of those people died of cancer—*cancer*, mind you, that's a lot, it's nearly half the total—why don't the clerks at Somerset House find out the *cause* of cancer instead of doing sums? that's what *I* say. *What* did you say? Your boy who works at University College under Professor Karl Pearson says you can't draw general conclusions from three deaths out of seven? Well, there you are! What did I say, why do the fools waste our money on *printing* these things when they don't mean anything? What they ought to do is to use their *brains*, tell us what these figures mean, not leave Professor Karl Pearson and your boy to work it out." My man in the street dissents from my man in the statistical laboratory fundamentally; he wants less raw material and not necessarily more, but more dogmatic, comment.

I have sometimes in a cynical mood wondered what would happen, if *none* of the tabular matter—not even the special tables in the volume of comment (which we officially call the *text volume*) of the Registrar-General's Annual Review were printed and published. From critics of Class A (the educated critics) I think there might come a hundred protests from within the United Kingdom and about as many from abroad; but why should we worry about these foreigners in such times as ours? The hundred inland protests would probably be reduced to less than fifty, if *all persons who could make out any sort of official case for needing all or any of the missing tables were supplied with copies of those they wanted.* The words I have italicized incidentally suggest an objection to the general case set up by Class A. Official statistical departments were not primarily created for the information of the public, but to enable the servants of the public to carry out the tasks—some of them foolish ones—imposed upon them by parliament. The publications of the General Register Office are historically a mere by-product of a machinery created for immediate practical ends—to secure accurate legal records of individual happenings, to make crime against the person less easy, etc. By evolution and devolution the by-products themselves have become of administrative importance and there is hardly a single tabulation published which, if it were not published, would not be required in order to enable some officials to discharge duties imposed on them by what is quaintly described as the Will of the People. But, as these officials are not all members of the Royal Statistical Society, there must be *some* officials able to explain what the tables mean. The bulk of the comment upon the data actually prepared by officials for the guidance of officials and ministers exceeds by a hundredfold anything ever printed. The paradise of the unofficial expert, wherein it is the whole duty of Civil servants to bring him data to interpret is—a paradise, never to be gained.

So far as Class B are concerned, the number of members of it who would complain if Somerset House never issued a single table, but did continue to publish a text quotable in the daily papers, is about as great as of those who cried God save King Richard. Indeed, speaking *pro hac vice*, as an official having some technical knowledge of and interest in statistical methods, the temptation to give Class B all they think they want is almost more than I can bear. We should be able to do all the statistical work we still do; no unofficial critics would harry us. No official of the Ministry of Health would be called upon to explain that the alarming mortality from cancer in Hambleden (Bucks) was not due to over-consumption of salt or under-consumption of vitamins; any demand for publication of the data upon which our conclusions are based would be countered by the stern formula: The Minister regrets that in the interest of public economy, etc. And that is a paradise of officials lost and never to be regained. Lost, because bureaucrats, squandermaniacs, job-holders—I am not sure what is the fashionable term of contempt—are not worse citizens than members of Class B, only better educated, and are quite alive to the danger which my Class A mentions. At the present time there are some branches of statistical enquiry which very few unofficial statisticians pursue at all. Let me take my own subject. There are probably fewer than fifty grown men and women outside a Government department doing any scientific work at all which requires as raw material the data issued from the General Register Office, and of that fifty nearly all are either in the public health municipal service or research workers in one of the half-dozen university departments with properly equipped statistical laboratories. The needs of this handful could be catered for without any elaborate publications. But, if they were so satisfied, one of two things would happen. In another generation there would not even be fifty or, alternatively, a good deal more money would be spent on the compilation of private statistics. It has been pointed out in this Society already that even now, with our sufficiently lavish publication of official data, private enquirers do not always seem to take advantage of what the State has done.

If private investigators are not given free access to official data, either they will organize unofficial enumerations or interest themselves in other subjects. The fact that private investigators without any official credentials are very few ought not to lead us to neglect them. A young Galton whose curiosity had been excited by the perusal of an odd volume of the Registrar-General's Reports in a public library would be worth the expense of printing all our official statistics for a generation. I admit that vital statisticians wholly unconnected with the public service are few, that even of that small number some may owe allegiance to masters not more but less fair-minded than the "bureaucrats," and that some of the ultimate residue are not expert in the handling of data. Still, if but two or three are gathered together in the name of wholly disinterested research, I would cheerfully see a good deal of public money used to provide them with data.

I pass now to a more particular consideration of the *matter* of official statistical documents. The General Register Office twelve years ago gave an example of a procedure which is worth discussion. I refer to Part II of the *Supplement* to the 75th Annual Report of the Registrar-General. This is a memoir by our distinguished colleague here, Dr. E. C. Snow, on methods of constructing an abridged Life Table. The memoir is, in my opinion, a valuable contribution to applied statistics; from the point of view of a teacher who has to instruct students often untrained in mathematical methods it is particularly commendable, because every step is explained in such a way that any intelligent person can follow what is being done. That this document *ought* to have been made available to the public through *some* channel I have no doubt whatever.

In a preface, the Registrar-General then in office, Sir Bernard Mallet, sets out the reasons why the report is published as an official document. He points out that in the first part of the *Supplement*, which had been published six years before, it had been noted that certain investigations were on foot for the purpose of devising a simple method for the construction of an abridged life table. He mentions that these enquiries had been independently promoted by the Department itself and by several private investigators, and he gives a short history of some of the investigations. He continues: "At this stage the Department became aware that Dr. E. C. Snow, with whom, as with other statisticians, frequent consultations had taken place over matters of statistical interest, was engaged in private investigations having the same objects in view. In these circumstances, in view of the nature of the enquiry *and of the incidental character of the Department's concern therein*, the most suitable method of procedure appeared to be that Dr. Snow should continue his investigation with the assistance of the results previously obtained by the Department, which were accordingly placed at his disposal for the purpose." The italics in this quotation are mine. The view taken by the Registrar-General was that, having found that an unofficial worker had made better progress than the official investigators with the study of a problem not of primary importance to the work of the Department, the proper course was to leave the research in the hands of the private worker but to publish his results officially. That seems to me a very reasonable view, which can be supported by additional arguments. It would not have been easy for Dr. Snow to secure full publication of this memoir in an unofficial journal. The expense of printing the tables would have been too great for most journals; the editors of those circulating mainly among experts might have insisted on curtailment of the explanatory matter, while the editors of more popular journals might have objected that the subject was too technical for their readers. Ultimately, perhaps, only a brief abstract would have been made public.

That is the case in favour of the action taken. Can anything be urged on the other side? The last time I opened a discussion in this Society, it was on the subject of Life Tables, and there was almost general agreement that the scientific value of life tables had been considerably exaggerated by the less statistically minded of those interested in public health matters. Statisticians who took that view might hold that it was not in the public interest that official prominence and encouragement should be given to a method of summarizing data which had already acquired too great prestige. It could further be said that the "frequent consultations" of the Department with private statisticians were not a satisfactory substitute for, let us say, direct application to the learned societies specially concerned with vital statistical methods, such as the Institute and Faculty of Actuaries and this Society. Lastly, it might be said, that subsidized publication in an unofficial journal would have been a better way of making the work available. None of these considerations impresses me much except the last. It was not denied by the severest critics that life tables were of value for some scientific purposes, and there are no useful things which stupid people can be trusted not to misuse. With regard to a report on methods, anybody who has ever been chairman or even member of a committee of "experts" knows that its reports, *if they are to be made public*, tend to follow the pattern of the summing-up in the action of Bardell *v.* Pickwick. There is, however, something to be said for the method of subsidized publication. The only example within my personal experience of this plan was the publication in special issues of the *Journal of Hygiene* of the reports and investigations of the Indian Plague Commission. That method had the advantage of bringing the work done to the notice of the section of the public likely to be interested in it, while to retain the *format* of a scientific journal has some psychological advantages.

A middle course is the system of the Medical Research Council, which publishes in its Special Report Series, not only the work of its own investigators, but also of private scientific workers. These reports are official publications in the sense that they are published and put on sale by the Stationery Office, but the Council itself, acting on the advice of its technical committees, assumes no more responsibility for them than it is the duty of any editor or editorial committee to assume. Through this channel not a few valuable vital-statistical and epidemiological reports have been circulated. Having been closely connected with the statistical part of the Medical Research Council's work for more than ten years, I can speak with experience of the advantages and disadvantages of the system. A principal advantage is that statistical papers undergo a more systematic criticism than private editorial boards or even Departmental staffs can usually offer. A disadvantage is that the imprint of the Stationery Office and the official status of the Medical Research Council give journalists an excuse, although no reason, for identifying the conclusions drawn by the author with the views of the Medical Research Council, and so, by the familiar metonymy of loose writers, with the views of "the Government." A kindred disadvantage is that the reading public for official reports is not coextensive with the public interested in the subject-matter of the reports. There still lingers among even educated people a certain prejudice against the supposed dullness of official publications which even the splendid volumes of the Historical Monuments and the Historical Manuscripts Commissions have not quite exorcised.

On the whole, therefore, but with considerable doubt, I am inclined to think that it is better for the scientific researches of those, whether whole-time Civil servants or private investigators who are using official data, not to be published in documents of a formally official character, which the periodic reports of the General Register Office must have. To that extent I range myself among the Class A critics. I recognize, however, that in the practice of essentially medical-statistical research, the plan adopted by the Medical Research Council is likely to become the standard procedure.

There remains the question of the content of the *strictly* official matter. As has often been pointed out, the Registrar-General does not tabulate and analyse the causes of death of those who die in England and Wales, he tabulates and analyses the opinions respecting those causes expressed by more or less well-informed persons. But, in some cases, these opinions are not only erroneous, but can be proved to be erroneous. Let us suppose, for example, that 100 persons have been certified by medical practitioners to have died of a medically interesting but uncommon disease, and that these data are duly published in the official report. This disease being by hypothesis of interest, let us suppose that the details of each case are scrutinized by some other official body consisting of persons particularly expert in the diagnosis of the disease. They, we will suppose, reach the conclusion that only 25 of the 100 deaths were really due to the disease, and their results are officially published elsewhere. Then, if any emotion is stirred by circumstances attending this disease, for instance, by controversy about the value of some treatment or method of prevention, the *bona fides* of one or other official statement will be questioned. Our older Fellows will remember how, in the earlier days of the " vivisection " controversy, the Registrar-General's publications used to be cited by one of the protagonists as conclusive evidence of the folly and wickedness of modern experimental medicine. It is, in my view, wholly impossible for such a Department as the General Register Office to play the part of Providence; as Dr. Stevenson has said here, it is absurd to fancy that anybody sitting in an office in the Strand can know better than the doctor who attended the patient what really killed the patient. He may indeed know that what the doctor *said* is wrong, but he is certainly not in a position to say what is right. Can, then, nothing be done to mitigate the kind of contradiction which I have described?

Much has already been done, for instance by the method of special enquiry in cases of vague statement. But when a statement is not vague but yet, in all probability, wrong, that method fails.

One method which suggests itself is to publish prominently in each report a statement of the official procedure and to warn readers of the unreliability of particular categories. There are, however, objections to this. In the first place, the serious consumers of the statistics are a small body most of whom are quite alive to the dangers, while mere partisans will never heed the warnings. In the second place, it would not be easy to get agreement amongst those who have some claim to be described by the ambiguous term expert as to how far warning notices might go. I, for instance, and several others, would willingly transfer all deaths certified as due to Status Lymphaticus, Status Thymicus or Status Thymico-Lymphaticus, to the heading of Unknown or Ill-defined Causes of Death, but I should be very surprised to hear that such action would be generally approved by " experts."

It will be seen that, so far as official vital statistical documents are concerned, my bias is towards the conservatism which, Sir Arthur Newsholme said in a discussion of a similar topic here twenty-two years ago (*J.R.S.S.*, 1910, LXXIII, 708), attacked all Government officials. I am not an advocate of shorter and brighter blue books. I think we might, perhaps, go a little further than we do in explaining the nature of the contents. The issue of a Guide to Official Statistics was a valuable step in the right direction, and perhaps small manuals, similar to the Statistical Handbooks of the League of Nations, might be prepared covering other classes of official statistical publications. But when all has been done that can be done, it will remain true that much knowledge of the subject-matter, as well as preliminary training in purely statistical methods, must be possessed by any person who wishes to make profitable use of official data.

Ludere qui nescit, campestribus abstinet armis, and nobody, not even a statistical adept, has any right to be annoyed because the meaning of a statistical report on technical data is not immediately obvious to a person unfamiliar with the subject-matter.

Mr. M. S. Birkett: When I was invited to take part in this discussion, I rather light-heartedly consented to compress my remarks into the space of ten minutes, but it is not easy; however, there will be so many eager to take part in a discussion of this nature that I must try to keep my promise.

First, let me say that whatever criticism may be made of official statistics, we are sympathetic with the limitations of finance and personnel which prevent official statistics, as well as our own, from being all that might be desired, and which makes it necessary at times to follow the worse course, while knowing and approving the better.

In the *Guide to Current Official Statistics* the titles of statistical publications issued by various Government Departments, with the briefest of descriptions of their contents, extend to nearly 50 pages. It will therefore only be possible to touch very briefly on a few aspects of official statistics and it may be that one's remarks will appear disjointed. I was told that I might treat the subject " in whatever manner seemed to me appropriate " and, if I liked, I might suggest the " suppression, modification or expansion " of any part of the information now published. I refrain from exercising the privilege of suggesting suppressions, but before I come to the question of expansion and improvement, may I say that in my opinion by far the most important task is to see that the data which are at present collected are tabulated and presented in such a way that they are of the maximum utility: in other words, we ought to consolidate the position we have won before we seek to advance further.

In discussing the various industrial statistics issued by the Registrar-General, Board of Trade, Inland Revenue and Ministry of Labour, the Report of the Macmillan Committee complains that " in general, the most detailed and careful comparison of these various figures does not enable the investigator to make use of any industrial figures except for a few broad groups of industries," and that therefore " for statistical and economic purposes much of their value is lost," and adds the inevitable conclusion with which we must all agree, that " it is desirable that as far as possible all these statistics should be on a plane of comparability." An example of this want of comparability occurred in the House of Commons a few weeks ago when, in making a speech on the desirability or otherwise of protection for the iron and steel industry, the President of the Board of Trade wished to emphasize the extent to which other industries were dependent upon iron and steel. He did this first by comparing the value of the output of the dependent trades, and secondly by comparing the numbers of insured workers in the iron and steel industry with the number of insured workers in the other trades, but the iron and steel industry for which he quoted the value was not coterminous with the iron and steel industry which he took for employment capacity.

It is largely because of this want of comparability that this Society has, from time to time, urged the formation of a central statistical department of the Government which, if not actually responsible for collecting official statistics of all kinds, shall keep in touch with all the Government Departments and have considerable influence in the framing of questionnaires and schedules and in the tabulation and presentation of the results, and it occurred to me that, if that desideratum is still a long way from being realized, there could still be a voluntary conference of statisticians, not confined to Government officials, who should meet at regular intervals and bring the statistics of the Government departments periodically under review.

I must confess that I had overlooked that in 1921 there was set up, as a result of a Petition from this Society, a " Permanent Consultative Committee on Official Statistics " and that this body is responsible for the very useful " Guide " already referred to, but on studying that publication I cannot see that they have issued any other report. The Committee was set up " for the purpose of ensuring more effective co-operation and co-ordination between the different departments in their statistical work," but the powers by which they were to attain this were very strictly limited, and the fact that ten years later the Macmillan Committee still has to complain of anomalies, suggests that it might be considered whether the Committee has, in fact, secured " most of the real advantages of centralization while avoiding its disadvantages " which was claimed for it. Incidentally I think the Society could endorse, almost without reserve, the whole of Chapter 5 in the Macmillan Committee's Report, which deals with " proposals relating to information and statistics," and should use its influence in ensuring that the recommendations are carried into effect at the earliest opportunity.

Turning to some of the more important of the Government statistics dealing with trade, let us consider the *Annual Statement of Trade.* Here, I would like to suggest first that an effort should be made to publish these volumes earlier. With regard to 1930 :—

Volume III appeared in August, 1931
,, II ,, ,, November, 1931
,, I ,, ,, December, 1931
,, IV ,, ,, January, 1932

They are, of course, huge volumes and entail a vast amount of labour, but since electrical tabulation has been adopted at the Custom House, might it not be possible to speed up the issue of these reports ? It is quite true that the year's totals for the main products of industry are available within a comparatively few days of the end of the year, and this is a highly creditable performance, but the monthly trade returns are more or less stereotyped, and it is the *changes* which have been taking place during the twelve months that we want to see. For instance, from the December trade return I find that in 1931, 110 tons of acid pig iron were imported from Sweden, but that 24,236 tons came from " other countries." What new competitor has arisen since the last revision of the headings in the monthly trade return ?

The ordinary student of the trade returns will have to wait until next November, when Volume II will appear, to find that this new source of supply of acid steel, or this new competitor, whichever way you look at it, is Holland. I suggest that in cases of this kind more use might be made of footnotes in the monthly trade returns.

The second suggestion I wish to make regarding the annual statement of trade is that the volumes should be prefaced with adequate comment. The four volumes of the annual statement of trade run to nearly 2,000 pages, but they are issued without any explanatory matter other than the standing introductory notes, and it seems to me that the compilers who have first access to the totals, and to whom the significance of the figures must have been brought home in the process of tabulation, should draw attention to the most significant facts in a brief preface. For example, when the volumes dealing with the foreign trade of 1931, and more especially of 1932, come to be issued, the preface should deal with the effects of our departure from the gold standard on our trade in particular products and with particular countries, and the effect of our departure from the policy of free imports. It seems to me to involve waste of valuable time, which might be better spent, to leave the independent investigator to study the four volumes and draw up his .own summary of conclusions.

The third suggestion I have to make with regard to the annual trade volumes is on their method of presentation. If one wants to know all the facts possible regarding the foreign trade in any particular industry it is necessary to purchase all the four volumes at a total cost of £4 5*s*., whereas the number of pages dealing with the iron and steel industry, for instance, is well under 100 and in many others considerably less. Even so it is impossible to analyse the imports of iron and steel *completely* according to country of consignment. True, we should want to compare the fortunes of the iron and steel industry with that of other industries and the fortunes of the iron and steel industry in particular markets with the way other commodities have fared in these markets; but I have much less hesitation than Professor Greenwood in recommending the issue of smaller volumes covering kindred trades in much the same way that the Registrar-General, in addition to volumes covering the whole country, issues volumes of the census results in County parts for the benefit of those interested in a limited area.

Finally, if the present system is adhered to, I think there should be a Volume V summarizing the foreign trade of other countries: the present quarterly returns are not enough.

May I have just one or two minutes on the Census of Production; I know that the taking of the Census of Production is hedged about by Act of Parliament with all sorts of restrictions, but it is very desirable that the Act should be amended and that the census should be expanded to cover *consumption* as well as production. To quote the same example which I gave a few moments ago—Mr. Runciman, in the speech to which I referred, said that there were 188,000 insured workers in the iron and steel industry, but 1,825,000 in the industries which were dependent on iron and steel. To what extent are they dependent upon iron and steel—and to what extent upon other industries? The list of so-called dependent trades includes shipbuilding, in which the degree of dependence is obviously high, but it also contains others in which the degree of dependence is comparatively low. Ought we not to attempt to measure this degree of dependence and ascertain not only the quantity and value of materials consumed by a given industry, but also what proportion of those materials is produced at home and what proportion comes from abroad? The question is of very considerable importance, for we want to know, if one industry is stimulated, on what others it will react and what is approximately the measure of the reaction on each. If these facts are not obtained from the Census of Production, then, to quote once more the words of the Macmillan Report, " many of the most important industrial statistics relating to the dependence of one industry upon another " will remain " extremely chaotic."

DR. ISSERLIS : I did not come prepared to speak at any length upon this subject to-night, but, since I have the opportunity, I would like first of all to remind members of this Society that so far as official statistics are concerned, access to the data which the Departments have is at present comparatively easy to those who have a real interest in the subject. I can give a good example of this, because only yesterday, in connection with the Import Duties Act, I spent several hours preparing certain information concerning one port only. This morning I had the brilliant idea of telephoning to the Board of Trade and enquiring whether they had prepared that information for the country as a whole, and within an hour I obtained an answer which would have required a week or two of really hard work on my part to obtain. I am sure that my case is not an exception in this way.

I was very much struck with what Professor Greenwood said. To him the problem of the scientific use of the statistical material was in itself an important one, and I felt as I was listening to him, as a poor man often does when a rich man complains, " I am not so well off as you people think. It is true I have replaced my Daimler by one of the latest models, but I should like to have a second one."

The people who make use of the Registrar-General's statistics are in an infinitely better position than the people who make use of the Returns of Trade and Navigation. It is not so much because of the superior merits of the Registrar-General's Department, but because of the enormous difficulties with which the other Departments have to deal. If you have 45 million people who are all born and of whom a great number will marry, when the time comes, and all of whom will die, you have a substantial basis on which to draw certain general conclusions and subject them to the methods of mathematical analysis. But the subject-matter with which Mr. Birkett was dealing and with which I deal in my daily work are Returns of Trade and of Shipping, and it is impossible to get any substantial part at all homogeneous in character. It is not possible to say, " Here are 40,000 units which will all die when the time comes."

There are one or two small points about which the consumers of official statistics can and do, when the occasion arises, make their annual and bi-annual complaint. Five or six years ago I took the opportunity by correspondence of expressing my great appreciation of the shipping statistics published by the Board of Trade, but I have a perennial complaint. The Customs take note of everything that comes into this country and everything that goes out, yet we are only supplied with official statistics of the tonnage of vessels entered with cargoes, and the tonnage of vessels cleared of cargoes—information which is a very poor substitute for what we want to know, which is the quantities of the various cargoes imported and exported.

There are a number of shipowners who perhaps feel in the same way as the iron and steel trade, that protection of their particular industry is something that can be considered, and they want to know what part the foreigner plays in the trade of this country with foreign countries, with the Dominions, in the trade of one Dominion with another, or the domestic trade of this country. All that we can say is, "The Board of Trade Statistics show that the following proportions of vessels cleared were under British Flag," but whether the vessels so cleared with cargo carried 2 tons or 19,000 tons, the official statistics say nothing about it. I mention this as one illustration; perhaps another may appeal to the Honorary Secretary. A distinguished Professor wrote a few days ago to *The Times* on the subject of the balance of trade. He made it quite clear that the statements provided by the Board of Trade were not equally intelligible to all readers, but it must be admitted that if he had gone more deeply into the matter, he would have found that data which the Board of Trade summarized in that statement could have been made more precise and would have led to more useful results if the Board had made greater use of the powers it already possessed, as I have indicated, through the Customs Returns.

These are a few disjointed remarks, and I do not propose to say anything more, excepting again to state that my own experience is that what the Departments have collected is readily available, and perhaps it would be well if this fact were better known to the young Galtons mentioned by Professor Greenwood. If they were to get in touch with the appropriate Department and establish their bona fides, they would have placed at their disposal whatever information the Department possessed. This, at least, is my own experience with one Department, and I imagine it is the case with the rest.

PROFESSOR BOWLEY: In thinking over the subject for discussion I did not feel quite sure of the range to be covered, but took it to be very elastic. I should like, first, to consider the field or extent of official statistical publications, and would again remind the Society of the establishment of the Consultative Committee on Statistics and the circumstances which led to its formation, because I wish to read a quotation from their response to the petition sent by certain members of the Statistical Society in 1921, which was as follows:—"The proposition that the Government has responsibility with regard to statistics covering the whole life and activities of the community has never been accepted in this country and no provision is therefore made by the National Machinery of Administration to discharge such an obligation." One's only comment could be, "Well, that's that," but fortunately more has been given than was promised or indicated in that comparatively formal and legal statement.

I have from time to time, at the Society's meetings and elsewhere, tried to persuade people to urge the better provision of statistics needed for the study of industrial and economic questions, and I am afraid I have sometimes appeared to criticize rather than to praise. I should like now to take the opportunity of pointing out some of the new fields of public statistics which have become available in recent times. For example, there is the development of the Census of Production. The convenient form of publication and the acceleration that has taken place in connection with the 1930 Census are things that should not be passed over without some expression of gratitude. In connection with that, there is the Index of Production, and also those papers on official statistics which Mr. Flux and other members have from time to time brought to the Society by way of elucidation and extension. More recently there has been some examination of retail trading—the figures published in the *Board of Trade Journal* and in the Bank of England's circular of the turnover of certain multiple stores, etc. Here is a region that is evidently being explored with the intention of extending the knowledge of production to the field of distribution. Here I would ask whether any serious effort is being made to increase knowledge, or rather to remove ignorance, on the extent of the stocks of commodities. I hope that the Board of Trade have already explored that problem and that presently they will be able to offer something to the advantage of statisticians in that very important region.

In another field—that of the statistics arising out of the Unemployment Insurance Act—it is possible to follow employment and its changes in detail from month to month and year to year, which fifteen years ago would have been an inaccessible paradise for people who wished to study these movements. Those who have heard Professor Hilton speak on the subject, and who have studied those extraordinarily interesting investigations by sample which he has several times explained before the Society, will know that there is not only this new group of statistics, but that the application of the method particularly appeals to mathematical statisticians. The Ministry of Labour is giving very important information.

I regret that the weekly figures in the Live Register have been discontinued, because this leads to misunderstanding. The result is a delay of some weeks in following out the movement of employment; I do not know whether these figures are still compiled, but if so I should like to be put on the free list and have a copy sent to me every week; I would promise not to communicate them to any misguided foreigner.

In wages is a field which was explored more thoroughly in 1886 and 1907 than it is to-day. I suppose it is not known generally outside the Society that there are no statistics whatever of distribution of wages in the country, and there have not been since 1907—only average wages in industries. Everyone knows that in the Census of

Production it is impossible to include this investigation, but members of the Society are entitled to express a strong view that the lack of these figures is very serious, and any possible objection on the part of employers to giving the necessary data, such as were collected in 1907, ought to be overcome by peaceful persuasion or otherwise.

The scope of official statistics has been diversified in other ways during recent years, but I do not wish to make a full category; I should prefer to spend a minute or two in considering a different aspect—the question of comparability of statistics. I was shocked when, on Southern Ireland becoming statistically independent of this country on April 1, 1923, the Board of Trade gave no information to show what difference that would make to public trade statistics at the moment—and very imperfect information at any further time. There is a gap that could only be filled by guesswork between the figures prior and subsequent to that date.

Another curiosity in Trade figures is the following: if anyone sends a parcel abroad he has to fill up an elaborate form stating the contents, expense, and value. I believe that the Customs officials counted the value as about one pound per parcel prior to 1928, and two or three pounds later, this amount being credited to parcel post. A tabulation ought to be made from time to time of the contents of parcel post packets.

Very recently the Board of Trade changed the basis of its index-number to 1930. That is going to be disastrous. This new change, unless it is made good by adequate means of comparability with earlier years, will create an enormous difference in the use of these statistics. Perhaps it is not too late to make comparable series in some convenient form. Similarly, the sudden change to the revaluation of exports with the base year 1930 is very inconvenient, though possibly justifiable; some information is given that made comparability possible for earlier years, but by no means all. Every change in basic data or method is rather disastrous to the user, and I do not think the officials are sufficiently alive to the necessity of carrying on the double method of computation. There was trouble in 1921, when the Census was deliberately made non-comparable with anything that had gone before. The Statistical Society, as a body, ought to protest against such changes.

I agree with Professor Greenwood that the essential thing to be given is adequate definition. It is necessary to know what the figures entered mean; then it is possible to make use of them in a statistical tabulation, without any prolonged commentary.

Mr. Vivian: Although the Opener in his statement likened his observations to those of Junior Counsel opening a case, they seem more closely to resemble the summing-up of a learned Judge, delivered with all the completeness one is accustomed to from the Bench, and all the wit the Society has learned to expect from Professor Greenwood. It is somewhat difficult to follow him on the same level. I wish to pursue the question of comment or no comment, regarding comment not merely as the explanation of the contents of the headings, but in the sense of the detailed statistical exposition of the inferences and significances to be derived from the statistical material. Is it properly in the province of a statistical Government Department to make a practice of publishing such comment? My own personal feeling is that on the whole it is undesirable, though with one important reservation. In coming to that conclusion I am probably influenced by the fact that my own department is perhaps *par excellence* the producer of statistical material for other people's use. The first reason seems to me to be very important, and it is one which Professor Greenwood touched upon in a slightly different connection—the limitations unavoidably imposed on a Government statistician in setting forth his inferences from the material. It may be possible in some world made safe for science for an official statistician to follow freely the conclusions he personally derives from the material, even though they are adverse to the policy of the Minister who presides over his Department. But that point has not been reached and is probably a paradise never to be gained. Restraints of that nature are accompanied by man-traps within and spring-guns without. It is very difficult for such expositions always to avoid conclusions which may appear to take sides in some popular controversy. The inevitable result would be that the official statistician would be attacked and defended by the opposing parties to the controversy, and taken by the public as a controversialist himself. It is doubtful whether the establishment of truth is likely to be hastened if one of the few sources of impartial knowledge of the facts of the case is exposed to public suspicion of partisanship, thus losing public acceptance of its truth and fairness.

This is one aspect of the matter; the other is one which has been impressed upon me in my personal experience and relates to the difficult question of how much statistical material should be supplied to the public, and what should be supplied. "Nothing in excess" is an axiom imposed upon the Department by many considerations, but I have never known a statistician to admit that the material made available in his own province is excessive, although frequently he suggests that the provision made for the other man is excessive. Thus the question of what should or should not be published is invariably a balance of choice between contending demands,—and an extraordinarily difficult choice—because it has to be made between two alternative demands for which there is no yard-stick, and which it is as impossible to compare on intrinsic merits as a fine piece of sculpture with a fine piece of music. In making the choice one looks to any criterion which can reasonably be used, and in the case of a demand for a repetition of any particular kind of statistics it is a useful criterion to consider whether the statistics of the same sort previously supplied have been made any real use of,—whether there is any evidence that the material has been utilized for any public purposes or scientific research. I remember a case in which this criterion was applied to a request for the repetition of a very heavy census enquiry entailing extensive tabulation, and in fact it appeared that no serious work was done upon the material except in the published comment by statistical officers of the Department. Regarding the Department's duty as that of producing statistical material for the use and research of other people, it would be fair to refuse repetition on the ground that the previous publication was not in fact used. But no such criterion can be applied if the retort can be made, "it is the Department's business to carry out research upon the material as well as to produce it."

On these two grounds I am inclined towards a minimum of official analysis and comment or exposition. My reservation is this: If tabular matter alone is produced, the form of the tables must take the mould determined by previous experience and advice based upon that experience. They will tend, therefore, to be framed so as to illustrate the drifts and significances which were previously noted in earlier figures. What is wanted is a current analysis of the current figures, as they are in course of being produced, which will enable the form of the tables to be expressly shaped so as to throw up new points of importance not previously noticed. The commentator will thus have one foot in the factory and one foot in the study: he will see the material as it comes off the machine, will notice any unexpected turn in the figures which seems significant. He can have a special tabulation made in order to keep this peculiarity of the figures under observation, and, if its existence is confirmed and seems important, he can arrange to have the current material published in a form which exhibits this new significance and can draw attention to it in his textual comment. Without analysis and comment of this kind tabular material will always be framed on what may be called *a priori* lines, and the figures will tend to illustrate the discoveries of the past rather than to disclose their own.

On these grounds, therefore, my own feeling is that the public product of Government statistical departments should be limited to the tabular matter together with so much official analysis and comment only as is necessary to discover, and warn the statistical world of, any new movements in the figures which may be discernible, leaving, however, the full utilization of the material to the public, scientific or otherwise, for whose benefit it is supplied.

MR. MACROSTY: If it were not that the time is late, I would like to break a lance with Professor Bowley with regard to his comments on the shifting of the annual basis of the index-numbers. My own view is diametrically opposed to his, and I hold that no index-number, especially of prices, can retain its value unless it is re-examined and re-based at intervals of about ten years. A fetish should not be made of continuity, otherwise no reforms in statistics would be attained.

A distinguished Civil servant, on being asked to come and take part in the discussion this evening, replied that he thought it would be improper of him to praise his colleagues, and indecent of him to criticize them. I feel that my own connection with the Service is still so recent that I am in much the same predicament, but I will admit—with the exception of those remarks of Professor Bowley's to which I have already alluded—the truth of most of the criticisms which have been made by the various speakers on the defects of at least those branches of statistics with which I have been most closely acquainted. I think I could make a defence in each individual case, but I do not propose to do so.

This leads me to a subject not precisely that included in the title of the paper, but a cognate one, viz. "the quantity and quality of official statisticians." With regard to the quantity there is not much to be said. Throughout my long acquaintance with official statistics, I have never known an official statistical Department which was not shamefully understaffed and cruelly over-worked, and to that can be attributed most of the defects which all will admit are found in existing statistics.

Some people are born to statistics, like the Edgeworths, the Yules, the Pearsons. Other people achieve statistics, and there are a good many of them in this Society. A third group have had statistics thrust upon them, and that has been the case with most of the official statisticians within the range of my knowledge. Those who have been assiduous and lucky have managed to graduate into the second class. I will not tell you how; that is a trade secret! To have good statistics and good statisticians it is necessary to respect statistics and to respect statisticians. No one will openly admit to-day that he feels disrespect for statisticians; the matter is a great deal more subtle than that. When I joined the Board of Trade ever so many years ago, I had a talk with a certain Private Secretary as to the desirability of my ceasing certain outside activities. I said that I understood that I must not contribute to the monthly magazines, but I asked, "What about the *Journal* of the Royal Statistical Society and the *Economic Journal?*" and the reply was, "Oh, that is all right; nobody reads them!!" That sort of thing is passing away now. Then there is the attitude of the politician who as a rule does not care twopence about statistics except when he wants something to support some statement he is going to make in a speech. "Sir A. B. is going to speak next Thursday at such a place on such a topic. He will say so-and-so. Please supply statistics in support." I will not say in which Department that minute came along, and there is no significance in the initials or in the title. It was some years ago that that occurred, and that attitude too has been subject to some improvement.

There is a third form of disrespect which really is of importance, and that may be called "the Treasury point of view." That view is that statistics can be done by anybody who is capable of handling the first four rules of arithmetic; there is no need to worry more than that, it is a mere matter of shoving figures about. That point of view works out in all sorts of ways. Probably most of the Fellows present are not aware that the Treasury keeps a detective department whose business it is to see that no one gets paid more money than the quality of the work on which he is engaged deserves. I remember that some years ago a young man from that department came along to see whether I was really doing work which was worth the munificent remuneration I was receiving. He asked what I was doing. Very mildly I explained that there was a good deal of routine work, but that in addition to that I sometimes had to prepare memoranda for the Permanent Secretary and the President. "Oh yes," replied the young man in lofty tones, "statistical memoranda!" Still more mildly I explained that I had from time to time to prepare economic memoranda—of course with a statistical basis. "What," was the crushing reply, "what has this Department to do with economics?" I am glad to say that after all he did not reduce my salary.

I want to say quite plainly that it is people such as you in the audience this evening who are responsible for that kind of thing. In your capacity as Fellows of the Royal Statistical Society you are all right, but in your capacity as taxpayers and voters it is what you do at the polls that determines what is done in the Statistical Departments of the State. If you want improvements in the Statistical Departments, better publications, and more detailed and more intelligent statistics, you must see to it at the proper time that that is made a necessary part of the policy of any Government. If you do not do that, then you must put up with what you get, and be very glad that it is as good as it is.

DR. SNOW: I should like to make a remark illustrating the last sentence but one in Dr. Greenwood's paper, "When all has been done that can be done it will remain true that much knowledge of the subject-matter, as well as preliminary training in purely statistical methods, must be possessed by any person who wishes to make profitable use of official data." An admirable illustration of the truth of that statement has been provided in the last few months in connection with the work of the Macmillan Committee. The Committee wanted to get some idea of the change in the net output per head in 1928 and 1929 as compared with 1924, the year in respect of which the last Census of Production was taken. The staff of the Economic Advisory Council put before the Committee some tables purporting to estimate the figures required. These estimates were based upon the indices of production of certain industrial groups issued quarterly by the Board of Trade. Allowance also had to be made for the change in the level of prices, and the average values of the imports in various groups were used for this purpose. The tables finally produced were published in an appendix to the Report of the Macmillan Committee. That table was discussed at length by the Committee, and it was clear from the report of the discussion that a number of the members were feeling puzzled by it. Two or three of them seemed to have a suspicion that there was a "snag" in it, but none of them detected what the trouble was, and it was adopted for publication. According to this particular table, the little industry with which I am associated was supposed to have increased its profits between 1924 and 1928 by £9 million in spite of the fact that 14,000 men lost their jobs in the interval. This made me suspicious of the table and I examined it thoroughly with a view to discovering the source of the fallacy. I found that the underlying assumption had been made that change in net output was proportional to change in gross output. In other words, if raw materials doubled in price, then wages and profits also doubled. The point I want to make is that the fallacy was not detected, even by the economists on the Committee, until someone who happened to have special knowledge of the subject-matter had his attention drawn to it. If the Macmillan Committee or the Economic Advisory Council had consulted the Statistical Department of the Board of Trade at the time, the source of the fallacy would no doubt have been pointed out to them, as the experts in that Department have a close acquaintance with the difficulties associated with " gross " and " net " output per head. I consider that this experience is a very apposite illustration of the importance of the point stressed by Professor Greenwood regarding the competent method of handling official data.

Professor Bowley referred to industrial statistics, and particularly to the Census of Production, and if this meeting had been held last week I should have liked to have referred to the Census of Production at length. Much of the time of the staff employed seems to have been taken up in turning out information of interest to particular industries but not necessarily of national interest. I think it is desirable that the information of national interest should be turned out quicker, and this might be done if they dropped supplying a good deal of the information of value only to particular trades. Individual industries should be competent to get out that information of particular concern to them, leaving it to the Board of Trade to get out promptly the really national data. Within the past week, however, the Import Duties Bill has been published, and this contains a clause which should receive the hearty approval of all statisticians whatever their political views. Authority is given in that clause to conduct a Census of Production on general lines dealing with the points of really national interest in such a way as to get out the results quickly. I do not know if this new statistical authority will supersede the old Census of Production, but at any rate there does seem to be sound hope that in future particulars will be available fairly early each year of the net output of industry in the previous year.

Mr. Macrosty referred to the question of the part played by official statistics in administration. My own small experience is that 80 per cent. of administration consists in getting the right information, and only just the information, required, and 20 per cent. in exercising judgment and taking decisions on that material. If this is really the general experience of administrators, the statistician should play a more important part than he does at present in the official machine. In illustration of the point, I will relate an incident which occurred during the war when the Allies were short of wool. An International Conference had to be called on the subject of wool supplies and was presided over by a high Cabinet Minister. The meeting was attended by high officials from various countries, and among the satellites was a statistician—a temporary Civil servant. When the Conference had proceeded for some time the big-wig turned to the statistician and said, " What is the price of wool? " The statistician started to reply by saying that there were 130 grades of wool, whereupon the big-wig said, "I asked you a plain question and I want a plain answer." A profession whose business it is to concentrate the whole of the information about wool prices in a single sentence so that an administrator can pass prompt judgment is surely a profession which should rank high in the hierarchy of administration.

Sir Josiah Stamp: It is now thirteen years since I gave up all responsibility for what was to go into a blue-book and what was not, and I remember very distinctly the three classes of difficulty I had then. They have been very well illustrated this evening. If a paper and discussion of twenty years ago on this subject had been read, the extraordinary difference in the facts under discussion between that time and the present would be most surprising. Data and material have just been discussed which would never have been dreamed of at that time, but underlying all, the same human factors are to be found throughout.

Professor Greenwood's dichotomy of the population into A and B would probably vary slightly with different classes of statistics. People in class A for vital statistics might be found in class B for trade statistics. If a Government statistician says he will not let anything more on a certain subject go into a blue-book in the way of information and comment unless the reasons shown from outside are overwhelming, he takes one definite line, but, on the other hand, he may say he will let everything possible go in, unless there is a strong departmental objection, and it is quite another matter to decide which line to adopt. The zone between them is wide, however. The amount of influence the individual official can have will play an important part in decisions within this zone. The responsibility of meeting enquiries nearly always gives rise to this reaction. I can well remember that if any budding Galton came along and wanted help, this was gladly given if he was obviously going to the trouble of mastering the fundamental data. If the enquirer would not go to that trouble I used to say, " I am perfectly willing to help you over a stile, but I cannot carry you about." If such a man is helped out of one difficulty he will probably very soon get into another.

The second type illustrated in Mr. Macrosty's remarks is common —the man politically inclined who merely wants to thump a particular drum, and who says: " I can't stand your damned footnotes. Drop them out." A student will treasure the footnotes and make even more of them than they require, but statesmen and politicians will not have footnotes; they want the price of wool in one figure and no nonsense about it. It depends upon whether the statistics in question can be made a focus of immediate public agitation as to whether those responsible will develop a protective covering from which they will refuse to be drawn.

Many classes of statistics, quite uncertain absolutely, are useful relatively; if any absolute error is constant it may be that the relative figures year by year are still valuable; but directly the figures become the focus of political discussion it may be the absolute figures that are wanted. I have presented figures on the coal industry to the Society, the whole importance of which was the relative comparability year by year. Suddenly, when the whole question of the coal industry boiled up into importance, these were the only figures available, and it was their absolute value that mattered and a 10 or 12 per cent. error in the total was very important and became the subject of political difficulties. The official statistician becomes very cautious of letting any figures get out that might suddenly be swept over from the relative to the absolute side. The relative aspects of the Balance of Trade figures have now given place to their absolute importance when we are considering whether we have passed the "zero" mark to an absolute unfavourable balance.

I remember my horror at the Revenue Office when they were about to introduce a law to make a great improvement in technique of income tax which completely ruined all possibility of comparability and continuity of series of figures that had been going on for seventy years, but the statisticians could not protest against the improvement.

These are some random points on the difficulties that arise, and now, as I have been going to the books as an outsider for thirteen years, I sympathise deeply with the compilers. In every field of official statistics there have been immense improvements made in the last thirty years, and the old Treasury view that the weakest man is the man for the Statistical Department is dead. If any Departmental officer deserves good remuneration for his services, it is this officer—either one who has a real flair for statistics or in whom the inducement of good remuneration will evolve a substantial imitation of it.

Professor Greenwood, in reply, said: In spite of the Registrar-General's very kind remark, I think my comparison of myself to the junior barrister opening the pleadings has been justified; almost all the speakers have made valuable contributions to our knowledge which concern matters outside my range of statistical experience. On that account it is neither necessary nor possible for me to attempt a general reply. I will, indeed, make only two observations. The first is that Professor Bowley's dictum that the Census of 1921 "was deliberately made non-comparable with anything that had gone before" seems to me an over-statement, so far as the data which interest me are concerned. It must always be a difficult matter to decide between the advantage of more accurate statement and the advantage of maintaining strict comparability with past records, and, so far as my own experience goes, those responsible for Census-taking in this country have done their work well. The second observation is that the Registrar-General's reference to the commentator who has "one foot in the factory and one foot in the study" touches a vitally important point. What I may call the Napoleonic method, the method of ordering subordinates to prepare tabulations from which a super-statistican shall deduce important truths, is, in my experience, a wholly unsatisfactory way of undertaking statistical investigation. He who would reach statistical truth must be humble-minded enough to examine minutely at least a sample of the raw material. Unless he does so, he cannot know whether it is worth tabulating, he is performing by deputy a part of the research which really makes serious demands upon one's critical powers. If in official publications the scope of comment is to be restricted, the Civil servant, with his foot in the factory, must be given more latitude for publishing his inferences in scientific journals than he has had in the past. Otherwise there is a danger that statistical research will become sterilized, because the research worker will lose that sense of reality which experience of the transmutation of raw material into tabular form keeps alive.

As a result of the ballot taken during the meeting, the candidates named below were elected Fellows of the Society:

Archibald David Newbery.
W. A. Shewhart, Ph.D.
K. L. Simhan.

Corporate Candidates.

Jack Kenneth Eastham *representing* The School of Economics and Commerce, Dundee,
Patrick McCarthy *representing* The Papermakers' Association of Great Britain.

P. 303. Summ[illegible] Ind[illegible]

"Vegetable Fo[illegible]" [illegible]931.	For 63	read 68	with corresponding corrections throughout text.
"Total Food" ... ... 1931.	" 79	" 83	ditto
"Grand Total" .. .. 1931.	" 82	" 83	ditto
"Silver" [illegible]. ... ... 1931.	" 240	" 20[illegible]	ditto

Last line, 1st col. For 1918–27 read 1818–27.

WHOLESALE PRICES OF COMMODITIES IN 1931.

By THE EDITOR OF THE "STATIST."

(The *Statist's* Index-Numbers in continuation of
Mr. A. SAUERBECK'S figures.)

THE following table of index-numbers compiled to the end of 1912 by the late Mr. Augustus Sauerbeck, and subsequently by the *Statist*, shows the course of wholesale prices of forty-five commodities during the last twenty-four years as compared with the standard

Summary of Index-Numbers. Groups of Articles, 1867–77 = 100.

	Vegetable Food (Corn, etc.).	Animal Food (Meat, etc.).	Sugar, Coffee, and Tea.	Total Food.	Minerals.	Textiles	Sundry Materials.	Total Materials.	Grand Total	Silver.*	Wheat Harvest.†	Average Price of Consols.‡	Average Bank of England Rate ‡
												£	Percent
1873......	106	109	106	107	141	103	106	114	**111**	97·4	80	92½	4·750
1896......	53	73	59	62	63	54	63	60	**61**	50·5	112	110¾	2·483
1907......	69	88	48	72	107	77	78	86	**80**	49·6	113	84⅛	4·925
'08......	70	89	48	72	89	62	73	74	**73**	40·1	108	86$\frac{1}{16}$	3·013
'09......	71	89	50	73	86	64	76	75	**74**	38·9	113	83⅞	3·083
'10......	65	96	54	74	89	73	81	81	**78**	40·5	102	81$\frac{3}{32}$	3·725
'11......	70	90	61	75	93	76	81	83	**80**	40·4	110	79$\frac{5}{16}$	3·467
1912......	78	96	62	81	110	76	82	88	**85**	46·1	97	76$\frac{5}{32}$	3·776
'13......	69	99	54	77	111	84	83	91	**85**	45·3	105	73$\frac{21}{32}$	4·771
'14......	75	100	58	81	99	81	87	88	**85**	41·6	109	72$\frac{1}{16}$	4·038
'15......	108	126	70	170	126	92	109	108	**108**	38·9	106	65½	5·000
'16......	133	152	86	130	158	129	136	140	**136**	50·4	97	58 [illegible]	5·470
1917......	177	192	113	169	172	192	174	179	**175**	65·8	102	54⅜	5·15
'18......	168	207	130	174	192	222	202	206	**192**	76·4	111	56⅞	5·0
'19......	179	213	147	185	220	228	219	222	**206**	85·3	98	54$\frac{1}{32}$	5·166
'20......	227	263	198	234	295	262	244	264	**251**	76·1	96	47$\frac{1}{16}$	6·71
'21......	143	218	83	158	181	140	145	153	**155**	48·1	118	47$\frac{23}{32}$	6·092
1922......	107	184	82	130	142	134	124	132	**131**	51·6	105	56$\frac{15}{32}$	3·692
'23......	98	162	101	122	155	140	117	134	**129**	49·4	105	57$\frac{29}{64}$	3·496
'24......	119	158	105	130	158	170	120	146	**139**	50·7	107	56$\frac{31}{64}$	4·0
'25......	118	162	89	128	154	165	119	143	**136**	52·5	114	56⅜	4·575
'26......	108	150	88	119	154	133	114	131	**126**	47·1	99	54$\frac{19}{32}$	5·0
1927......	108	138	83	114	141	131	118	129	**122**	42·8	109	54$\frac{19}{48}$	4·650
'28......	107	142	78	114	123	136	117	124	**120**	44·0	109	55$\frac{11}{16}$	4·5
'29......	99	146	72	110	126	122	111	119	**115**	40·2	114	54$\frac{5}{16}$	5·508
'30......	77	142	54	96	112	84	97	97	**97**	29·0	99	56	3·4
'31	63	119	50	79	100	63	85	82	**82**	24·0	99	55$\frac{7}{16}$	3·975
Average 1904–13	68	91	53	73	95	74	76	81	**77**	44·1	106	82$\frac{25}{32}$	3·733
1890–99	61	80	63	68	71	56	66	64	**66**	55·8	103	103$\frac{9}{16}$	2·958
'78–87	79	95	76	84	73	71	81	76	**79**	82·1	97	99$\frac{9}{16}$	3·264
1918–27	109	90	151	111	128	105	106	112	**111**	98·0	—	—	3·692

* Silver 60 84*d* (see note on p. 309) per oz, being the parity of 1 gold to 15½ silver = 100.

† Wheat harvest in U.K. to 1895: 29 bushels = 100; from 1896: 30 bushels = 100.

‡ Average price of Consols and the average Bank of England rate of discount are actual figures, not index-numbers; Consols 3% to 1888, 2¾% from 1889, 2½% from April, 1903.

period of eleven years, 1867–77, which in the aggregate is equivalent to the average for the twenty-five years 1853–77 (see the *Journal*, 1886, pp. 592 and 648, and 1893, pp. 220 and 247). There are added corresponding data for 1896, the year of lowest prices, and for 1873 just after the Franco-Prussian War.

The all-commodities index-number for 1931 (based with very few exceptions on the average of fifty-two weekly quotations for each commodity) is 82. This figure is 15·5 per cent. below the average of the preceding year, 67·3 per cent. below that of 1920, the year of highest prices recorded in this series, and 34·4 per cent. above that of 1896, the year of lowest prices. For the seventh consecutive year the price level has fallen and it is necessary to go back twenty years to find a lower level. The complete series of annual all-commodity index-numbers is shown in the table below, which records the Sauerbeck-*Statist* index-numbers since 1846, *i.e.* from the commencement of the calculations together with Jevons' figures adjusted to Sauerbeck's standard for the years 1809, 1810 and 1818.

THE STATIST'S *Annual Index-Numbers* (*in continuation of Sauerbeck's figures*).

Year.	Average No.	Year.	Average No.	Year.	Average No.	Year	Average No.	Year.	Average No.
1931	82	1913	85	1895	62	1877	94	1859	94
'30	97	'12	85	'94	63	'76	95	'58	91
'29	115	'11	80	'93	68	'75	96	'57	105
'28	120	'10	78	'92	68	'74	102	'56	101
'27	122	1909	74	'91	72	'73	111	'55	101
'26	126	'08	73	'90	72	'72	109	'54	102
'25	136	'07	80	1889	72	'71	100	'53	95
'24	139	'06	77	'88	70	'70	96	'52	78
'23	129	'05	72	'87	68	1869	98	'51	75
'22	131	'04	70	'86	69	'68	99	'50	77
'21	155	'03	69	'85	72	'67	100	1849	74
'20	251	'02	69	'84	76	'66	102	'48	78
1919	206	'01	70	'83	82	'65	101	'47	95
'18	192	'00	75	'82	84	'64	105	'46	89
'17	175	1899	68	'81	85	'63	103	'18	159*
'16	136	'98	64	'80	88	'62	101	'10	171*
'15	108	'97	62	1879	83	'61	98	'09	189*
'14	85	'96	61	'78	87	'60	99		

* Jevons' numbers adjusted.

The following shows a ten-year moving average of the above figures :—

Last year, in analysing in this *Journal* the trend of commodity prices in 1930, it was suggested that the major changes in the price levels of the previous sixteen years appeared to be the results of

1818–1827 = 111
'28– '37 = 93
'38– '47 = 93
'48– '57 = 89
'58– '67 = 99
'68– '77 = 100
'78– '87 = 79
'88– '97 = 67
'90– '99 = 66
'91–1900 = 66
'92– '01 = 66
'93– '02 = 66
'94– '03 = 66
'95– '04 = 67

1896–1905 = 68
'97– '06 = 70
'98– '07 = 71
'99– '08 = 72
1900– '09 = 73
'01– '10 = 73
'02– '11 = 74
'03– '12 = 76
'04– '13 = 77
'05– '14 = 79
'06– '15 = 82
'07– '16 = 88
'08– '17 = 98
'09– '18 = 110

1910–1919 = 123
'11– '20 = 146
'12– '21 = 148
'13– '22 = 153
'14– '23 = 157
'15– '24 = 162
'16– '25 = 165
'17– '26 = 164
'18– '27 = 159
'19– '28 = 152
'20– '29 = 142
'21– '30 = 127
'22– '31 = 120

fundamental changes in the monetary factor. The abandonment of automatically controlled monetary systems, as a result of the war, coincided with the rise in prices which culminated in 1920, while on the other hand the gradual return to more ordered monetary arrangements and eventually to the gold standard coincided with the decline in prices back to the 1914 level. Now, having reached the pre-war level of prices, the international monetary system has again been thrown into the melting-pot. The climax of the financial crisis last summer was the suspension by Great Britain on September 21, as a result of the withdrawal of foreign balances from London, of that section of the Gold Standard Act of 1925 which requires the Bank of England to sell gold at a fixed price. This event had an immediate effect on the internal level of prices, for, as will be seen from the table printed below giving the monthly indices, prices have shown a slight upward tendency from September, 1931. The explanation of this rise must be sought, of course, in the decline which occurred in the gold value of sterling. The *Statist's* index of the gold value of sterling, based on the percentages of parity at which the pound stood in relation to the gold currencies, shows the following fluctuations :—

August, 1931	100·15
September 1–19	100·18
,, 21–30	82·63
October	79·74
November	76·76
December	69·52
January, 1932	70·70
February	71·16

Having regard to the sharp decline in the value of sterling in terms of gold (75·34 per cent. of parity for the last three months of 1931), the rise in prices must be regarded as relatively small, particularly in view of the importance of imported commodities in the index-number. Some of the reasons which may account for this are—(*a*) several countries which are important suppliers of goods to this country followed it off the gold standard, (*b*) several of the main importing countries already had their currencies tied to sterling, (*c*) the existence of large stocks of staple commodities and (*d*) the persistence of " dumping."

Whether this relatively small rise in prices is likely to measure permanently the effects of the suspension of the gold standard may well be questioned. The budgetary and financial conditions in Great Britain are doubtless sufficiently well balanced to prevent any recurrence of inflation here, but the situation abroad is by no means as satisfactory. Following the British suspension of the gold standard, similar steps were taken by India, Egypt, Portugal and the Straits Settlements, and later by Denmark, Norway, Sweden, Finland and Japan. Many other countries, though not definitely abandoning the gold standard, have virtually done so by means of prohibiting the export of gold and by strictly controlling foreign exchange transactions; among such countries are Germany, Austria, Hungary and Chile, where, however, exchange restrictions preceded our suspension of the gold standard. Exchange restrictions followed the latter event in Bulgaria, Yugoslavia, Greece and Czechoslovakia. There are also effective checks to the free export of gold in Canada, Italy, Poland and Rumania. In fact, of the twenty-seven gold or gold exchange standard currencies previously existing there now remain only six—the United States, France, Belgium, the Netherlands, Switzerland and the Union of South Africa. It is possible to feel that this account justifies the remark made earlier, that the international monetary system has again been flung into the melting-pot, and what the outcome may be is difficult to foretell with any great precision. It is indeed becoming clear that many of those countries which are maintaining a pretence of holding to the gold standard by foreign exchange restrictions are only doing so at the price of considerable economic and financial effort. It may well be feared that, in present circumstances, the strain may become excessive and that a currency breakdown followed by inflation is not beyond the realms of possibility unless adequate steps are taken in the meantime. A repetition of the monetary events which followed the war would, of course, result in a rise in prices here, as elsewhere.

Another factor affecting the future price level in Great Britain particularly was the imposition, from March, 1932, of a general *ad valorem* duty on all imports with certain exceptions. Approximately this raises the volume of imports liable to duty from about 15 per cent. to nearly 50 per cent of the total. It is clear that a tariff extension of this sort, though the actual duty may for the most part be comparatively low, cannot be without effect on the price level, above all when it is read in conjunction with the depreciation of sterling.

January, 1929—*February,* 1932.

	Vegetable Food.	Animal Food.	Sugar, Tea, and Coffee.	Foodstuffs.	Minerals.	Textiles.	Sundry Materials.	Materials.	All Commodities.
1929.									
Jan. ...	102·2	138·4	75·7	**109·9**	127·0	130·1	113·2	**122·1**	**117 0**
Feb. ...	104·6	145·1	75·4	**113·4**	129·8	131·2	117·7	**125·1**	**120·1**
March ...	101·8	144·6	75·2	**112·0**	133·9	130·9	118·9	**126·6**	**120·5**
April ...	97·2	149·2	74·5	**111·6**	125·7	123·8	113·7	**120·0**	**116·5**
May ...	91·0	145·6	72·3	**107·2**	124·0	120·1	111·1	**117·4**	**113·0**
June ...	90·3	150·1	72·7	**108·6**	125·3	119·7	108·4	**116·4**	**113·1**
July ...	103·4	144·7	72·1	**112·0**	126·1	117·2	112·2	**117·5**	**115·2**
Aug. ...	100·1	143·9	70·7	**110·0**	127·3	116·8	109·8	**116·6**	**113·9**
Sept. ...	96·3	141·6	72·3	**107·9**	127·2	112·7	111·3	**116·0**	**112·6**
Oct. ...	94·8	144·2	66·7	**107·1**	124·4	109·7	110·7	**114·1**	**111·1**
Nov. ...	89·8	142·6	64·4	**103·9**	121·6	106·9	108·3	**111·5**	**108·3**
Dec. ...	89·2	148·8	61·5	**105·3**	122·6	107·2	107·0	**111·2**	**108·8**
1930.									
Jan. ...	85·7	151·7	60·4	**104·7**	123·7	98·3	105·2	**108·1**	**106·6**
Feb. ...	79·3	156·0	57·5	**102·9**	120·7	96·5	104·0	**106·2**	**104·8**
March ...	77·3	148·5	56·9	**99·2**	118·8	94·4	105·5	**105·7**	**103·0**
April ...	78·7	149·5	57·2	**100·3**	112·2	94·2	102·4	**102·5**	**101·5**
May ...	76·4	138·5	56·3	**95·1**	111·1	94·6	100·4	**101·5**	**98·8**
June ...	75·0	139·2	53·0	**94·0**	109·1	88·3	95·8	**97·1**	**95·8**
July ...	78·4	135 2	49·8	**93·3**	110·0	82·5	94·9	**95·2**	**94·4**
Aug. ...	78·5	128·7	47·6	**90·5**	109·5	76·5	95·3	**93·4**	**92·2**
Sept. ...	75·3	132·4	48·3	**90·7**	107·4	73·0	93·6	**91·0**	**90·8**
Oct. ...	74·5	131·4	52·6	**90·9**	105·3	72·7	92·9	**90·0**	**90·4**
Nov. ...	72·3	127·4	51·6	**88·2**	105·9	70·2	91·6	**88·9**	**88·6**
Dec. ...	68 8	131·1	50 8	**87·9**	105·0	63·9	90·3	**86·1**	**86·9**
1931.									
Jan. ...	68·1	131·5	50·6	**87·8**	102 8	61·2	89·1	**84·2**	**85·7**
Feb. ...	69·0	124·3	48·6	**85·1**	104·6	62·8	90·4	**85·7**	**85·5**
March ...	69·9	126·1	46·5	**85·7**	102·8	64·0	89·8	**85·4**	**85·5**
April ...	69·9	127·1	48·7	**86·5**	100·1	63·2	86·0	**82·8**	**84·4**
May ...	67·8	123·0	49·1	**84·2**	96·0	59·8	86·1	**80·7**	**82·2**
June ...	70·8	119·9	48·6	**84·2**	99·7	61·3	84·6	**81·5**	**82·6**
July ...	66·4	118·9	46·5	**81·6**	96·4	59·1	83·0	**79·2**	**80·2**
Aug. ...	66·5	118·2	43·7	**80·8**	99·2	55·6	80·6	**77·9**	**79·1**
Sept. ...	68·0	115·1	50·8	**81·8**	99·9	61·0	81·1	**79·9**	**80·7**
Oct. ...	73·7	108·4	51·5	**81·8**	100·4	64·4	84·7	**82·7**	**82·3**
Nov. ...	76·0	105·1	53·6	**82·0**	102·4	66·0	84·9	**83·8**	**83·0**
Dec. ...	77·6	110·2	55·9	**85·0**	103·7	68·4	86·8	**85·7**	**85·4**
1932.									
Jan. ...	77·0	108·3	53·5	**83·6**	104·0	69·0	85·7	**85·5**	**84·7**
Feb. ...	83 3	111·1	52·1	**87·0**	102·6	67·8	90·1	**86·7**	**86·7**

Silver.—The year 1931 saw a continuation of the fall in the sterling price of silver, new low records, in fact, being reached during the first nine months of the year. Following the suspension of the gold standard the sterling price rose, the monthly average for August being 12·815 pence per standard ounce and that for December

20·023 pence. The average for 1931 was, however, lower than for the previous year, and this probably accounts for the decline in production :—

World's Production of Silver (in millions of ounces).

	United States.	Mexico.	Canada.	Australia.	Other Countries.	Total.
1901... ...	55·2	57·6	5·2	10·2	44·8	173·0
'02... ...	55·5	60·2	4·3	8·0	34·8	162·8
'03... ...	54·3	70·5	3·1	9·7	30·1	167·7
'04... ...	57·7	60·8	3·7	14·5	27·5	164·2
'05... ...	56·1	65·0	5·9	15·0	30·3	172·3
'06... ...	56·5	55·2	8·5	14·2	30·6	165·0
'07... ...	56·5	61·0	12·8	19·0	34·8	184·2
'08... ...	52·4	73·6	22·1	17·2	37·8	203·1
'09... ...	54·7	73·9	27·5	16·3	39·7	212·1
'10... ...	57·1	71·4	32·9	21·5	38·8	221·7
'11... ...	60·4	79·0	32·7	16·6	37·5	226·2
'12... ...	63·8	74·6	31·6	18·1	36·2	224·3
'13... ...	66·8	70·7	31·5	3·5	51·4	223·9
'14... ...	72·4	27·5	28·4	3·6	36·5	168·4
'15... ...	74·9	39·5	28·4	4·1	37·3	184·2
'16... ...	74·4	38·2	25·4	4·2	26·6	168·8
'17... ..	71·7	35·0	22·2	10·0	35·3	174·2
'18... ...	67·8	62·5	21·2	10·0	35·9	197·4
'19... ...	56·7	62·7	15·7	7·4	32·0	174·5
'20... ...	55·5	66·8	12·6	7·5	33·0	175·4
'21... ...	53·1	64·5	13·1	4·9	35·7	171·3
'22... ...	56·2	81·1	18·6	11·3	46·3	213·5
'23... ...	73·3	90·9	17·8	10·3	50·2	242·5
'24... ...	65·3	91·5	19·7	10·8	52·2	239·5
'25... ...	66·1	92·9	20·2	11·1	54·8	245·1
'26... ...	62·7	98·3	22·4	11·2	59·0	253·6
'27... ...	60·4	104·6	22·7	9·0	57·3	254·0
'28... ...	58·4	108·5	21·9	9·0	59·5	257·3
'29... ...	61·2	108·7	23·1	10·0	58·7	261·7
'30... ...	51·0	105·0	26·0	8·0	58·0	248·0
'31* ...	31·0	89·0	20·0	7·0	45·0	192·0

* Provisional.

One incidental effect of the strains to which the gold standard was put has been the revival of schemes to incorporate silver in the monetary system, and these have from time to time affected the market. The prices and index-numbers are as follows (60·84*d.** per standard oz. being parity of 1 gold to 15½ silver = 100):—

	Price per oz. standard.	Index-number.		Price per oz. standard.	Index-number.
	d.			*d.*	
Average 1873 ...	59¼	=97·4	*Lowest* Nov., 1902	21 11/16	=35·6
,, '90–99...	34	=55·8	End Dec., 1906 ...	32 5/16	=53·1
,, 1917–26...	40½	=66·6	,, Dec., '08 ...	23 3/16	=38·1
,, 1893 ...	35⅝	=58·6	,, Dec., '11 ...	25 1/16	=41·2
,, '96 ...	30¾	=50·5	,, Dec., '12 ...	29	=47·7
,, 1909 ...	23 11/16	=38·9	,, Dec., '13 ...	26 9/16	=43·7
,, '13 ...	27 9/16	=45·3	,, June, '14 ...	26	=42·7
,, '14 ...	25 5/16	=41·6	,, Dec., '14 ...	22 11/16	=37·3
,, '15 ...	23 11/16	=38·9	,, Dec., '15 ...	26¼	=43·1
,, '16 ...	31 5/16	=50·4	,, Dec., '16 ...	36½	=58·7
,, '17 ...	40⅞	=65·8	,, Dec., '17 ...	43½	=70·0
,, '18 ...	47½	=76·4	,, Dec., '18 ...	48 7/16	=77·9
,, '19 ...	57	=85·3	,, Dec., '19 ...	77¼	=98·3
,, '20 ...	61 9/16	=76·1	,, Dec., '20 ...	40⅞	=49·2
,, '21 ...	36⅞	=48·1	,, Dec., '21 ...	34⅝	=49·3
,, '22 ...	34 7/16	=51·6	,, Dec., '22 ...	31 9/16	=49·6
,, '23 ...	31 15/16	=49·4	,, Dec., '23 ...	33 7/16	=49·0
,, '24 ...	34	=50·7	,, Dec., '24 ...	31 13/16	=50·4
,, '25 ...	32⅛	=52·5	,, Dec., '25 ...	31 11/16	=52·1
,, '26 ...	28 11/16	=47·1	,, Dec., '26 ...	25	=41·1
,, '27 ...	26 1/32	=42·8	,, Dec., '27 ...	26½	=43·6
,, '28 ...	26¾	=44·0	,, Dec., '28 ...	26⅜	=43·3
,, '29 ...	24 7/16	=40·2	,, Dec., '29 ...	21 7/16	=35·2
,, '30 ...	17 11/16	=29·0	,, Dec., '30 ...	14 7/16	=23·7
,, '31 ...	14⅗	=24·0	,, Dec., '31 ...	20 7/16	=33·7

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* All the index-numbers in the table from 1916 to 1925 inclusive are calculated on the basis of the gold prices of silver instead of the sterling prices, though the latter are, of course, the actual price quotations given in the table. In arriving at the index-numbers the price of gold during 1916, 1917 and 1918 is taken as 86*s.* 9½*d.* per fine oz., derived from the "pegged" New York rate of $4·76½ to the £. For 1919 the average price of gold is taken as 93*s.* 4¼*d.*, this being the parity price with the U.S. dollar, the average New York exchange in that year being $4·429. The index-numbers for other dates are based on the quotations in the London market for exportable gold. The average price in 1920 was 112*s.* 11¼*d.* per fine oz., in 1921 107*s.* 0½*d.*, in 1922 93*s.* 4*d.*, in 1923 90*s.* 3*d.*, in 1924 93*s.* 8¼*d.*, and in 1925 85*s.* 5½*d.* At the end of 1919 the quotation was 109*s.* 8½*d.*, at the end of 1920 116*s.* 1*d.*, at the end of 1921 98*s.* 0*d.*, at the end of 1922 88*s.* 11*d.*, at the end of 1923 95*s.* 4*d.*, and at the end of 1924 88*s.* 2*d.*

Gold.—The following table shows the world's annual gold production since 1850. Prior to 1911 the estimates are those of the Bureau of the U.S. Mint and other authorities. The value is taken throughout at £4·25 per fine oz. The estimate for 1931 is subject to revision.

(000's omitted.)

Year.	Value of output. £
1850	11,600
'51	17,200
'52	26,550
'53	31,090
'54	25,490
'55	27,015
'56	29,520
'57	26,655
'58	24,930
'59	24,970
'60	23,850
'61	22,760
'62	21,550
'63	21,390
'64	22,600
'65	24,040
'66	24,220
'67	22,805
'68	21,945
'69	21,245
'70	21,370
'71	25,400
'72	24,200
'73	23,600
'74	22,950
'75	22,700
'76	22,540
'77	23,830
'78	22,020
'79	21,400
'80	22,130
'81	21,150
'82	20,500
'83	20,640
'84	20,830
'85	21,250
'86	21,430
'87	21,735
'88	22,644
'89	25,375
'90	24,421
1891	26,846
'92	30,134
'93	32,363
'94	37,229
'95	40,843
'96	41,559
'97	48,509
'98	58,949
'99	63,027
1900	52,312
'01	53,630
'02	60,975
'03	67,337
'04	71,380
'05	78,143
'06	82,707
'07	84,857
'08	90,995
'09	93,302
'10	93,544
'11	94,930
'12	95,783
'13	97,481
'14	92,709
'15	97,114
'16	92,597
'17	87,236
'18	78,605
'19	73,078
'20	68,522
'21	67,848
'22	66,723
'23	77,888
'24	81,807
'25	82,267
'26	82,211
'27	82,582
'28	83,961
'29	82,862
'30	85,700
'31	89,500

The monthly (end of month) all-commodities index-numbers since 1887, together with quarterly averages for the group and final index-numbers since 1920 inclusive, are shown in the following pages.

Monthly Fluctuations of the Index-Numbers of* 45 *Commodities*, 1867–77 = 100.

	Jan.	Feb.	March.	April.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1887	69·5	68·5	68·3	68·4	68·2	67·9	68·1	68·3	68·2	67·7	69·1	72·4	68
'88	70·9	70·6	69·9	69·8	68·1	67·4	69·0	70·1	71·9	72·4	72·7	73·2	70
1889	72·6	73·5	72·1	72·0	71·4	71·6	72·6	71·4	72·1	72·1	73·7	73·7	72
'90	73·2	72·7	71·5	71·2	70·8	70·5	71·2	72·8	72·2	72·9	71·2	71·1	72
'91	71·1	71·5	71·7	72·4	72·8	71·8	71·6	71·9	71·7	70·7	71·4	71·4	72
'92	70·0	70·0	69·1	68·9	68·8	67·7	67·8	67·4	66·8	67·4	68·2	67·7	68
'93	68·4	69·0	68·1	67·4	67·4	67·4	67·7	67·1	68·2	68·6	67·8	67·0	68
1894	65·8	65·0	64·3	63·8	63·1	63·1	62·6	63·0	62·7	61·7	60·8	60·1	63
'95	60·0	60·0	60·8	61·7	62·5	62·4	62·8	63·3	63·5	63·3	62·3	61·2	62
'96	61·4	61·4	60·7	60·3	60·1	59·3	59·2	59·7	61·2	62·6	62·6	62·0	61
'97	62·0	61·9	61·9	61·5	61·2	61·3	61·7	63·2	63·4	62·7	62·4	62·4	62
'98	62·8	63·4	63·0	65·5	66·4	64·7	64·3	64·0	63·9	63·6	63·9	63·8	64
1899	65·4	65·8	65·6	66·1	66·6	66·9	67·9	68·3	70·0	71·5	71·6	72·3	68
1900	74·0	75·1	75·7	75·6	75·5	75·7	76·2	76·0	75·5	74·7	73·9	73·4	75
'01	72·2	71·7	71·0	70·6	70·5	69·8	69·5	69·8	69·6	69·6	69·0	68·4	70
'02	68·8	68·9	69·2	69·7	70·9	70·4	70·0	69·5	69·3	68·8	68·6	69·1	69
'03	69·5	70·2	70·4	69·4	69·6	69·5	69·5	70·0	69·1	69·0	69·0	70·0	69
1904	70·4	70·8	70·8	70·5	69·9	69·4	69·9	70·4	70·7	71·0	71·2	70·9	70
'05	71·2	71·4	71·8	72·0	71·7	72·0	72·5	72·3	72·4	73·2	74·2	74·9	72
'06	75·2	75·0	75·7	76·5	77·0	76·9	76·4	76·7	77·5	78·5	78·6	79·7	77
'07	80·0	80·7	80·0	80·7	82·4	82·0	81·1	79·4	79·1	78·8	76·7	76·2	80
'08	76·0	74·5	74·1	73·8	73·6	72·9	73·1	72·2	72·5	72·2	72·2	72·3	73
1909	72·0	71·9	72·4	74·3	75·4	75·1	75·2	74·9	74·7	75·2	75·5	76·3	74
'10	77·1	78·1	79·1	78·5	78·2	76·9	78·1	78·2	77·6	77·2	77·8	77·9	78
'11	78·5	78·6	78·9	80·0	80·3	80·0	78·9	79·5	80·3	80·7	80·6	80·9	80
'12	81·8	82·9	84·4	85·0	85·3	85·5	86·5	85·9	86·7	85·8	85·3	86·4	85
'13	86·4	86·4	86·7	86·2	85·7	84·1	84·2	85·0	85·7	84·5	83·3	83·8	85
1914	83·5	83·8	82·8	82·3	82·3	81·2	82·4	87·9	89·3	89·8	88·8	91·6	85
'15	96·4	100·9	103·7	105·9	107·2	106·4	106·4	107·0	107·8	110·0	113·1	118·4	108
'16	123·6	127·0	130·4	134·2	135·4	131·0	130·5	134·5	134·4	141·5	150·8	154·3	136
'17	159·3	164·0	169·0	173·0	175·0	180·4	176·9	175·7	176·4	180·6	182·9	185·1	175
'18	186·2	187·3	188·0	189·8	191·1	192·3	192·9	195·9	197·1	197·8	195·3	196·0	192
1919	190·1	187·7	184·7	184·6	194·6	199·4	206·4	212·7	214·8	224·3	231·0	235·2	206
'20	245·3	260·4	261·8	266·1	260·0	255·7	254·6	253·5	248·7	239·9	223·8	207·2	251
'21	197·2	183·0	177·2	169·8	162·2	155·8	158·2	154·3	149·4	138·4	136·7	133·6	155
'22	132·5	132·2	133·3	134·8	135·5	135·6	134·0	129·6	127·9	130·1	130·6	129·1	131
'23	130·2	131·9	132·7	134·0	132·2	127·9	124·8	125·0	127·8	127·7	132·4	133·2	129
1924	137·2	138·8	137·0	136·8	136·4	136·3	138·4	138·0	141·6	146·1	145·5	147·7	139
'25	144·8	143·1	140·1	137·5	135·7	131·2	134·3	134·3	132·7	130·2	132·9	130·4	136
'26	129·3	127·9	126·1	125·5	125·7	124·9	126·0	127·0	128·0	131·0	130·8	123·9	126
'27	123·1	124·1	123·6	123·3	123·8	123·1	122·0	122·8	121·5	120·6	121·5	121·4	122
'28	120·9	121·1	123·6	125·6	126·	122·6	120·3	118·0	116·8	116·8	117·9	117·9	120
1929	117·0	120·1	120·5	116·5	113·0	113·1	115·2	113·9	112·6	111·1	108·3	108·8	115
'30	106·6	104·8	103·0	101·5	98·8	95·8	94·4	92·2	90·8	90·4	88·6	86·9	97
'31	85·7	85·5	85·5	84·4	82·2	82·6	80·2	79·1	80·7	82·3	83·0	85·4	82
'32	84·7	86·7											

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* The average of the twelve monthly figures of each year does not necessarily coincide with the annual figures, as the latter are calculated mostly from the average of 52 weekly quotations, while the former are based on end-of-the-month prices.

*Quarterly Movements of Prices.**

Summary of Index-Numbers, 1867–77 = 100.

Years	Quarters.	Vegetable Food (Corn, etc.).	Animal Food (Meat, etc).	Sugar, Coffee, and Tea.	Total Food	Minerals.	Textiles.	Sundry Materials.	Total Materials.	Grand Total.	Silver.†
'20	I	211·4	234·0	207·9	219·0	289·8	298·2	267·0	282·7	**255·7**	96·7
	II	244·5	250·1	243·0	246·3	296·3	271·8	254·5	271·1	**260·6**	79·2
	III	226·7	287·2	207·6	245·0	309·4	247·3	232·2	257·7	**252·3**	71·5
	IV	208·2	280·4	126·4	217·7	293·0	190·0	214·2	227·7	**223·6**	57·6
'21	I	151·4	270·6	100·1	184·5	222·6	153 5	187·9	186·7	**185·8**	46·8
	II	150·3	225·2	89·2	164·8	187·9	140·1	159·0	160·9	**162·6**	45·5
	III	149·8	202·5	81·4	155·3	174·3	142·7	147·6	153·4	**154·0**	48·0
	IV	118·3	166·9	78·3	127·8	149·6	150·0	132·3	142·4	**136·2**	52·4
'22	I	114·0	177·0	75·9	129·2	132·2	142·4	131·8	135·2	**132·7**	49·7
	II	116·0	199·5	80·3	139·2	134·7	136·0	128·3	132·4	**135·3**	52·9
	III	102·4	182·8	82·8	127·9	138·3	139·7	123·3	132·2	**130·5**	53·2
	IV	98·7	176·0	87·6	124·9	141·1	145·1	120·7	133·7	**129·9**	50·3
'23	I	94·0	175·3	100·6	125·3	154·4	139·4	122·2	136·2	**131·6**	50·1
	II	96·1	164·0	110·2	124·0	156·6	141·9	120·3	136·6	**131·4**	50·5
	III	100·3	157·7	96·2	120 6	149·0	134·8	113·9	129·7	**125·9**	48·2
	IV	101·1	152·0	105·1	120·7	158·9	153·5	115·0	138·7	**131·1**	48·8
'24	I	115·1	146·2	111·5	126·6	169·0	159·6	121·0	145·9	**137·7**	48·8
	II	118·3	155·3	97·2	127·5	156·7	165·2	118·4	143·1	**136·5**	49·9
	III	121·8	159·7	99·7	131·1	157·1	173·1	117·3	145·2	**139·2**	51·6
	IV	134·5	160 0	108·3	138·4	163·9	182·7	122·5	152·2	**146·4**	52·4
'25	I	129·0	165·6	98·8	136·1	157·0	171·6	123·9	147·5	**142·7**	51·6
	II	116·6	164·8	86·7	128·1	150·5	157·8	119·8	139·7	**134·8**	51·5
	III	112·6	163·3	83·5	125 2	153·9	159·2	117·3	140·1	**133·8**	53·3
	IV	108·9	155·1	82·6	120·4	153·7	159·8	114·5	139 0	**131·2**	53·1
'26	I	103·9	152·4	86·8	118·1	150·3	148·8	147·7	134·8	**127·8**	50·6
	II	104·1	155·0	88·4	119·5	148·0	135·7	113·7	129·7	**125·4**	49·3
	III	106·8	154·2	88·2	120·3	166·1	126·4	114·1	131·9	**127·0**	47·4
	IV	109·3	144·4	88·9	117·9	192·0	115·8	115·9	136·4	**128·6**	41·2
'27	I	108·1	143·4	85·4	116·1	155·0	120·7	118·3	128·9	**123·6**	43·0
	II	111·6	145·9	82·6	118·1	140·7	127·9	118·2	127·2	**123·4**	43·0
	III	106·9	138·1	80·8	112·9	133·3	139·8	118·1	128·8	**122·1**	42·1
	IV	104·5	132·1	82·0	110·0	132·8	138·6	120·6	129·5	**121·2**	43·3
'28	I	108·9	143·8	80·3	115·7	123·6	136·7	120·6	126·3	**121·9**	43·2
	II	118·0	152·0	81·1	122·8	122·9	140·6	117·9	126·3	**124·8**	44·7
	III	101·1	142·0	77·9	111·2	121·0	135·3	116·7	123·6	**118·4**	44·3
	IV	101·9	138·1	76·3	109·8	126·0	131·5	115·3	123·5	**117·5**	43·7
'29	I	102·9	142·7	75·4	111·8	130·2	130·7	116·6	124·6	**119·2**	42·8
	II	92·8	148·3	73·2	109·1	125·0	121·2	111·1	117·9	**114·2**	41·1
	III	99·9	143·4	71·7	110·0	126·9	115·6	111·1	116·7	**113·9**	39 6
	IV	91·3	145·2	64·2	105·4	122·9	107·9	108·7	112 3	**109.4**	37·3
'30	I	80·8	152·1	58·3	102·3	121·1	96·4	104·9	106·7	**104·8**	33 0
	II	76·7	142·4	56·5	96·5	110·8	92·4	99·5	100 4	**98·7**	29·8
	III	77·4	132·1	48·6	91·5	109·0	77·3	94·6	94·6	**92·5**	26·8
	IV	71·9	130 0	51·7	89·0	105·4	68·9	91·6	88·3	**88·6**	26·5
'31	I	69 0	127·3	48·6	86·2	103·4	62·7	89·8	85·1	**85·6**	21·8
	II	69·5	123·3	48·8	85·0	98·6	61·4	85·6	81·7	**83·1**	21·3
	III	70·0	117·4	47·0	81·4	98·5	58·6	81·6	79·0	**80·0**	21·9
	IV	75·7	107·9	53·7	82·9	102·2	66·9	85·4	84·1	**83·6**	30 9

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* The averages of the four quarterly figures to each year do not necessarily coincide with the annual averages, as the latter are based as far as possible on average weekly prices. See also the *Journal*, 1893, p 221; 1895, p. 144; 1901, p. 90; and 1909, p. 70.

† Silver 60·84*d.* per oz., being the parity of 1 gold to 15½ silver, = 100.

P. 312. Table—" Quarterly Movements of Prices" 1931.
4th quarter, "Silver." For 30·9 read 21·5.

Construction of the Tabular Statements.

The index-numbers here given are based on the average prices for the eleven years 1867–77. Take, for instance, the *Gazette* price of English wheat:—

	s.	*d.*	
Average, 1867–77 ...	54	6	= 100, average point.
„ 1914 ...	35	0	= 64, or 36 per cent. *below* the average point.
„ 1920 ...	80	7	= 148, „ 48 „ *above* „ „
„ 1926 ...	53	3	= 98, „ 2 „ *below* „ „

The individual index-numbers, therefore, represent simple percentages of the average point.

The articles are grouped in six categories:—

		1867–77. Total Numbers.	Example for 1931.	
			Total Numbers	Average.
1. Vegetable food, corn, etc. (wheat flour, barley, oats, maize, potatoes, and rice) ...	8 Index-nos.	800	504	63
2. Animal food (beef, mutton, pork, bacon, and butter) ...	7 „	700	836	119
3. Sugar, coffee, and tea	4 „	400	199	50
1—3. *Food*	19 „	1,900	1,539	79
4. Minerals (iron, copper, tin, lead, and coal)	7 „	700	700	100
5. Textiles (cotton, flax, hemp, jute, wool, and silk) ...	8 „	800	504	63
6. Sundry materials (hides, leather, tallow, oils, soda, nitrate, indigo, and timber) ...	11 „	1,100	934	85
4—6. *Materials*	26 „	2,600	2,138	82
General Average	45 „	4,500	3,677	82

The general average is drawn from all forty-five descriptions, which are treated as of equal value, and is the simple arithmetical mean as shown above.

P. 313. "[illegible]al Num[illegible]"

Vegetable food.	For 504 read 544.	Also on page 314.	
1—3. Food.	„ 1539 „ 1579.	„ „	316.
General Average.	„ 3677 „ 3717.	„ „	319.

*Average Prices of Commodities.**

No. of Article	0	1	2	3	4	5	6	7	8	1–8	9	10
		Wheat.		Flour.	Barley.	Oats.	Maize.§	Potatoes.*	Rice.	Vegetable Food.	Beef ‡	
Year.	Silver.†	English *Gazette.*	American.	Town Made white(now "G.R.").	English *Gazette.*	English *Gazette.*	American Mixed.	Good English.	Rangoon Cargoes to Arrive.	Total.	Prime.	Middling
	d. per oz.	*s.* and *d.* per qr.	*s.* and *d.* per qr.	*s.* per sack (280 lbs.).	*s.* and *d.* per qr.	*s.* and *d.* per qr.	*s* per qr	*s.* per ton.	*s.* and *d.* per cwt.		*d.* per 8 lbs.	*d.* pe 8 lb
1873 ...	59¼	58·8	63	51	40·5	25·5	30	160	9·6	—	65	5
1911 ...	$24\frac{9}{16}$	31·8	35	29	27·3	18·10	25¼	87	8·2	—	51	4
'12 ...	$28\frac{1}{32}$	34·9	38	32	30·8	21·6	27½	86	10·1	—	56	4
'13 ...	$27\frac{9}{16}$	31·9	36·5	30½	27·3	19·1	23⅝	78	8·2	—	54	4
'14 ...	$25\frac{5}{16}$	35·0	40·1	33½	27·2	21·0	29¼	71½	9·1	—	56½	5
'15 ...	$23\frac{11}{16}$	53·11	59·10	49	37·4	30·9	41½	93½	13·3	—	72⅛	6
'16 ...	$31\frac{5}{16}$	58·5	67·7	52½	51·7	33·5	52¾	153½	16·10	—	81¼	7
'17 ...	40⅞	75·9	83·3	58½	64·10	51·7	71¾	186½	25·3	—	104½	10
'18 ...	47½	72·9	78·7	46¾	59·0	49·3	78⅔	142¾	26·2	—	103	10
'19 ...	57	72·10	74·10	46¾	75·8	52·3	78⅘	198½	25·10	—	108	10
'20 ...	$61\frac{9}{16}$	80·7	92·4	66	90	57·4	90⅔	242½	41·10	—	125	12
'21 ...	36⅞	72·9	73·9	64½	54·4	34·5	38⅓	198	18·5	—	115	10
'22 ...	$34\frac{7}{16}$	47·10	52·11	45¾	40·1	29·1	31¼	130	14·10	—	88⅝	8
'23 ...	$31\frac{15}{16}$	42·2	47·3	39½	33·8	26·8	36	101	14·10	—	79¼	7
'24 ...	34	49·3	53·9	43⅝	46·9	27·2	39⅔	186	16·9	—	82⅛	7
'25 ...	32⅛	52·2	62·4	50⅛	42·0	27·2	$38\frac{9}{16}$	154	16·0	—	80	7
'26 ...	$28\frac{11}{16}$	53·3	58·9	49¼	36·11	25·1	$29\frac{13}{16}$	127	16·3	—	74	6
'27 ...	$26\frac{1}{32}$	49·3	58·3	$44\frac{9}{10}$	42·0	25·4	$30\frac{9}{10}$	136	15·11	—	70	6
'28 ...	26¾	44·8	50·10	40⅙	39·0	29·0	$38\frac{11}{32}$	133	15·0	—	74	6
'29 ...	$24\frac{7}{16}$	42·2	51·3	38½	35·5	24·7	36¼	111	14·3	—	71	6
'30 ...	$17\frac{11}{16}$	34·3	36·10	$33\frac{1}{12}$	28·3	17·2	23	93	13·0	—	73	6
'31 ...	14⅜	24·0	25·1	22⅞	28·0	17·8	$15\frac{9}{16}$	146	9·8	—	67	6
Average 1904–13	26¾	31½	36	30	25½	18½	24½	78	7¾	—	51	4
1890–99	34	28½	31½	27½	25½	17½	19½	72	6¼	—	47	3
'78–87	50	40	43½	34½	31½	21	25	102	8	—	55½	4
'67–77	58½	54½	56	46	39	26	32½	117	10	—	59	5
	Index-Numbers (or Percentages) of Prices, the Average of 1867–77 being 100.											
1873 ...	97·4	108	113	104	104	98	92	137	95	851	110	11
1911 ...	40·4	58	63	63	70	72	78	74	82	560	87	9
'12 ...	46·1	64	68	70	79	83	85	74	101	624	95	9
'13 ...	45·3	58	65	66	70	73	73	67	82	554	92	9
'14 ...	41·6	64	72	73	70	81	90	61	91	602	96	10
'15 ...	38·9	99	107	106	96	118	128	80	132	866	122	13
'16 ...	50·4	107	121	114	132	128	163	131	168	1,064	138	15
'17 ...	65·8	139	149	127	166	199	221	160	252	1,413	177	20
'18 ...	76·4	134	140	102	151	190	241	122	262	1,342	174	20
'19 ...	85·3	134	134	102	194	201	242	170	258	1,435	183	21
'20 ...	76·1	148	165	143	231	221	279	207	418	1,812	212	25
'21 ...	48·1	133	132	140	139	132	118	169	184	1,147	195	22
'22 ...	51·6	88	95	100	103	112	96	111	148	853	150	16
'23 ...	49·4	77	84	86	86	103	111	86	148	781	134	14
'24 ...	50·7	90	96	95	120	105	122	159	167	954	139	15
'25 ...	52·5	96	111	109	108	105	119	132	160	940	136	14
'26 ...	47·1	98	105	107	95	96	92	109	163	865	125	13
'27 ...	42·8	90	104	98	108	97	95	116	159	867	119	12
'28 ...	44·0	82	91	87	100	112	118	114	150	854	125	13
'29 ...	40·2	77	91	84	91	95	112	95	143	788	120	13
'30 ...	29·0	63	66	72	72	66	71	79	130	619	124	13
'31 ...	24·0	44	45	50	71	68	48	125	93	504	114	12

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* The annual prices are the average monthly or weekly quotations, except potatoes, which are the average wee quotations during the eight months January to April and September to December.

† Not included in the general average. ‡ Meat (9—13), by the carcase, in the London Central Meat Mark

§ La Plata from 1924.

Average Prices of Commodities—Contd.

No. of Article	11	12	13	14	15	9-15	16A	16B	17	18A*	18B*	19
	Mutton		Pork.	Bacon.	Butter		Sugar.			Coffee.		
Year.	Prime *d.* per 8 lbs.	Midling. *d* per 8 lbs.	Large and Small, average *d.* per 8 lbs.	Waterford. *s.* per cwt.	Friesland, Fine to Finest. *s.* per cwt.	Animal Food. Total.	British West Indian Refining ‖ *s.* per cwt.	Beet, German, 88 p. c., f.o.b. *s.* per cwt.	Java, Floating Cargoes. § *s.* per cwt.	Ceylon Plantation, Low Midding † *s.* per cwt.	Rio, Good. *s.* per cwt.	Mean of 18A and 18B.
1873 ...	71	63	54	81	123	—	22½	25	28	100	86	—
1911 ...	55	49	46	56	121	—	11½	13	14	83	58	—
'12 ...	59	54	50	69	123	—	11	12¼	13⅜	87	66	—
'13 ...	62	56	55	77	119	—	9½	9½	10⅞	81	53	—
'14 ...	64	57½	49	75¾	120	—	11¾	12⅛	13⅝	79	45	—
'15 ...	75⅛	69¾	72	93¼	141	—	14⅜	17⅛‡	18¾	78½	43½	—
'16 ...	93½	86½	87¾	109¾	191	—	24¼	22¾‡	26½	77¾	50	—
'17 ...	114⅕	109⅕	110⅛	148	216	—	31½	25⅜‡	32¾	94¾	58	—
'18 ...	109⅕	109⅙	128⅘	183	247⅖	—	33	26½‡	35½	128⅔	69	—
'19 ...	114	114	128	190⅕	252	—	38⅙	34⅓‡	43½	145¾	114⅞	—
'20 ...	144⅔	144⅔	168¼	239⅔	301	—	58	65½†	74¾	148	111½	—
'21 ...	130⅞	125¼	121⅘	179	250	—	19½	18½‡	22	120¾	63	—
'22 ...	125	121⅖	101	145⅓	202½	—	15	14⅛	$15\frac{5}{16}$	120⅔	74⅓	—
'23 ...	114⅜	107¾	89	113¾	186	—	25½	23⅓	24⅔	117½	55	—
'24 ...	111½	103½	70	106	211	—	23⅜	20¼	21½	152⅝	85⅓	—
'25 ...	106⅜	98⅝	84½	128½	206⅞	—	16¼	11⅝	12⅓	$153\frac{13}{16}$	$98\frac{5}{16}$	—
'26 ...	89	80½	98⅝	130	173	—	$16\frac{7}{32}$	11⅔	12⅝	154⅔	$89\frac{1}{16}$	—
'27 ...	86	79¾	85	102¼	178	—	$16\frac{7}{16}$	12½	$13\frac{3}{16}$	143½	71½	—
'28 ...	92¼	87	77	101¾	185⅞	—	13½	$10\frac{11}{16}$	11½	$143\frac{9}{32}$	$81\frac{11}{32}$	—
'29 ...	89½	83	91	$116\frac{1}{32}$	180⅛	—	$11\frac{7}{32}$	$8\frac{5}{16}$	8⅞	141⅛	74⅗	—
'30 ...	92	86	89	105⅝	$146\frac{3}{16}$	—	8⅜	$5\frac{27}{32}$	$6\frac{13}{32}$	$106\frac{23}{32}$	$42\frac{11}{32}$	—
'31 ...	79	73	65	83⅜	130	—	$7\frac{11}{16}$	$5\frac{11}{16}$	$6\frac{7}{16}$	101¼	$33\frac{13}{16}$	—
Average 1904–13	58¼	51¾	47⅝	67	113	—	10⅛	10⅞	12	75½	43¾	—
1890–99	54½	41½	42¾	59	100	—	11½	11½	13¾	98	62	—
'78–87	64½	53	49	71	116	—	17	18	21½	78	52	—
'67–77	63	55	52	74	125	—	23	24	28⅛	87	64	—

Index-Numbers (or Percentages) of Prices, the Average of 1867–77 being 100.

Year	11	12	13	14	15	9-15	16A–16B	17	18A	18B	19
1873 ...	113	114	104	109	98	760	101	98	*115	*134	125
1911 ...	87	89	88	89	97	627	52	49	95	91	93
'12 ...	94	98	96	93	98	672	49	47	100	103	102
'13 ...	99	102	105	104	95	695	40	38	93	83	88
'14 ...	102	105	94	102	96	700	50	48	91	70	81
'15 ...	119	127	138	126	113	881	67	66	90	68	79
'16 ...	148	157	169	148	153	1,067	100	93	90	78	84
'17 ...	182	199	212	200	173	1,345	121	115	109	91	100
'18 ...	174	199	248	247	198	1,447	127	125	148	110	129
'19 ...	181	207	246	258	202	1,493	155	153	167	180	174
'20 ...	230	263	324	324	241	1,844	263	262	170	174	172
'21 ...	208	228	234	242	200	1,527	81	77	140	98	119
'22 ...	199	221	194	196	162	1,286	62	54	140	116	128
'23 ...	182	196	171	154	149	1,135	104	87	135	86	111
'24 ...	177	188	135	143	169	1,103	93	75	175	133	154
'25 ...	169	180	162	174	165	1,133	60	43	176	154	165
'26 ...	141	146	190	176	138	1,050	60	44	178	139	159
'27 ...	136	145	163	138	142	967	62	47	165	112	139
'28 ...	146	158	148	137	149	996	51	40	165	127	146
'29 ...	142	151	175	157	144	1,021	42	31	162	117	140
'30 ...	146	155	171	143	117	992	31	22	123	66	95
'31 ...	125	133	125	113	104	836	29	23	120	53	87

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* Index-numbers not included in general average.
† East India good middling from 1908.
§ Raw Centrifugals, 96 per cent. Pol., from 1924.
‡ Comparative values.
‖ White Javas, C.I.F., from 1924.

Average Prices of Commodities—Contd.

No. of Article.	19A*	19C*	19B*	19	16–19	1–19	20A	20B	21	22	—	23
	Tea.						Iron.			Copper.		Tin.
Year.	Congou, Common.	Indian, Good Medium.	Average Import Price.	Mean of 19A and 19B	Sugar, Coffee, and Tea. Total.	Food. Total.	Scottish Pig.	Cleveland (Middlesbrough) Pig.	Bars, Common.	Standard.	English Tough Cake.	Straits.
	d. per lb.	d. per lb.	d. and dec. per lb.				s. and d. per ton.	s. and d. per ton.	£ per ton.	£ per ton	£ per ton.	£ per ton
1873 ...	12	—	16·67	—	—	—	117·3	—	12½	84	92	132
1911 ...	5¼	8½	9·00	—	—	—	53·5	47·3	6⅜	56	60	191
'12 ...	5⅛	8¼	8·78	—	—	—	64·2	58·2	7⅜	73	78	210
'13 ...	5	8¼	9·06	—	—	—	65·6	58·3	7¾	68	73½	201
'14 ...	6	8⅝	9·19	—	—	—	57·1	51·0	7	59½	64½	151
'15 ...	8⅜	10½	11·01	—	—	—	71·2	65·2	10½	72¾	82½	164
'16 ...	8	10¾	11·29	—	—	—	90·0	84·0	13¾	115¾	134	182
'17 ...	16⅞	15¼	14·68†	—	—	—	95·7	89·7	13¾	124¾	136¼	238
'18 ...	20⅞	16	15·0	—	—	—	101·0	95·0	14	115½	126	331
'19 ...	13⅕	15	15·5	—	—	—	143·1	137·1	19⅓	92	99½	257
'20 ...	11¼‡	9⅖	14·97	—	—	—	214·11	208·11	28⅓	97⅕	112¾	302
'21 ...	4⅜	7	12·4	—	—	—	168·6	137·4	19⅛	69⅓	72⅜	171
'22 ...	8⅝	13⅔	14·9	—	—	—	99·10	90·7	11⅕	63⅓	66⅓	162
'23 ...	11	$17\frac{1}{16}$	17·58	—	—	—	108·0	108·9	11⅞	$65\frac{9}{16}$	$69\frac{15}{16}$	206
'24 ...	9¼	17¾	19·0	—	—	—	96·8	88·2	12½	$63\frac{3}{16}$	$67\frac{7}{16}$	251
'25 ...	7⅞	$14\frac{13}{16}$	18·34	—	—	—	83·4	72·8	11⅞	$61\frac{11}{16}$	65½	267
'26 ...	$7\frac{13}{16}$	$16\frac{15}{16}$	18·82	—	—	—	87·2	87·6	11½	$58\frac{13}{32}$	$63\frac{5}{32}$	$297\frac{9}{16}$
'27 ...	6¾	14⅜	18·58	—	—	—	80·5	73 0	11¼	55¾	$60\frac{9}{16}$	303⅞
'28 ...	$6\frac{5}{16}$	12¼	16·84	—	—	—	69·9	65 9	$9\frac{15}{16}$	63¾	$66\frac{1}{16}$	$229\frac{7}{16}$
'29 ...	$6\frac{1}{16}$	$11\frac{7}{32}$	16·11	—	—	—	74·0	70·3	9¾	$75\frac{9}{16}$	$78\frac{13}{32}$	$207\frac{7}{16}$
'30 ...	$5\frac{7}{32}$	9¼	15·12	—	—	—	76·0	67·0	$9\frac{31}{32}$	54¾	$58\frac{17}{32}$	$144\frac{23}{32}$
'31 ...	$4\frac{13}{16}$	$6\frac{1}{16}$	13·29	—	—	—	71·0	58·6	$10\frac{3}{32}$	38⅛	$39\frac{5}{16}$	121⅛
Average 1904–13	7⅞	7⅛	8⅛	—	—	—	57¾	51½	6⅞	67¾	72	164⅞
1890–99	4⅝	7½	9¾	—	—	—	47	41½	5½	50	53	81
'78–87	6¾	—	12¾	—	—	—	46	38	5½	55	60	89
'67–77	11¼	—	17¼	—	—	—	69	60	8¼	75	81	105

Index-Numbers (or Percentages) of Prices, the Average of 1867–77 being 100.

Year	19A*	19C*	19B*	19	16–19	1–19	20A	20B	21	22	—	23
1873 ...	*107	—	*97	102	426	2,037	170	—	152	112	—	126
1911 ...	47	—	52	50	244	1,431	78		77	75	—	182
'12 ...	48	—	51	50	248	1,544	95		89	97	—	200
'13 ...	44	—	52	48	214	1,463	96		94	91	—	191
'14 ...	53	—	53	53	232	1,534	84		85	79	—	144
'15 ...	74	—	64	69	281	2,028	106		128	97	—	156
'16 ...	71	—	65	68	345	2,476	135		166	154	—	173
'17 ...	150	—	85	117	453	3,211	144		166	166	—	227
'18 ...	186	—	87	137	518	3,307	152		170	154	—	315
'19 ...	120	—	90	105	587	3,515	217		234	123	—	245
'20 ...	100	—	88	94	791	4,447	329		343	130	—	288
'21 ...	39	—	72	55	332	3,006	237		232	92	—	163
'22 ...	77	—	86	82	326	2,465	148		136	84	—	154
'23 ...	98	—	102	100	402	2,318	168		144	88	—	196
'24 ...	82	—	110	96	418	2,475	143		152	84	—	239
'25 ...	70	—	106	88	356	2,429	121		144	82	—	254
'26 ...	69	—	109	89	352	2,267	135		139	77	—	283
'27 ...	60	—	108	84	332	2,166	119		136	74	—	28[illegible]
'28 ...	56	—	98	77	314	2,164	105		120	85	—	21[illegible]
'29 ...	54	—	93	74	287	2,096	112		118	101	—	198
'30 ...	46	—	88	67	215	1,826	111		121	73	—	138
'31 ...	42	—	78	60	199	1,539	100		123	52	—	115

* Index-numbers not included in the general average. † Approximate ‡ Nominal.

Average Prices of Commodities—Contd.

No of Article	24	25A	25B	26	20–26	27	28	29A	29B	30A	30B	31
	Lead.	Coal.			Minerals.	Cotton.		Flax.		Hemp.		Jute.
Year	English Pig. £ per ton.	Wallsend Hetton in London.§ s per ton.	Newcastle Steam. s. per ton.	Average Export Price. s and dec. per ton.	Total.	Middling American. d per lb.	Fair Dhollerah.‖ d. per lb	Petrograd.¶ £ per ton.	Russian Average Import Price £ per ton.	Manila Fair Roping. £ per ton.	Petrograd Clean. (a) £ per ton.	Good Medium †† £ per ton.
1873 ...	23½	32	—	20·90	—	9	6 3/16	47½	44	43	36	18
1911 ...	14⅜	17¾	10⅞	11·43	—	7·04	6	37	43½	20	33	20¼
'12 ...	18¼	21¾	14¾	12·70	—	6·45	5 5/16	36½	40½	26	37	21
'13 ...	19⅛	21½	15½	13·94	—	7·01	5 11/16	34	41¼	31¾	38	26½
'14 ...	19¼	21¼	14⅛	13·65	—	6·41	4 9/16	33	38	26¾	43	27⅛
'15 ...	24	30¼*	21⅛	16·96	—	5·87	4⅜	59¾	66⅜	41⅛	60½	21⅛
'16 ...	32½	27½*	41¼	24·64	—	9·00	7	76¾	85¼	54¾	71	31
'17 ...	32⅜	27½*	30	27·16	—	16·55	13⅝	113¼	151⅝†	84⅜	105½	39⅜
'18 ...	32⅜	33 6	33½	30·6	—	22·3	17⅛	120‡	156⅜	99⅜	166⅞	39¼
'19 ...	29⅜	45·3	45⅜	46·2	—	19·65	14¾	120‡	174⅜	58¾	147⅜	50⅛
'20 ...	40	32	51⅛	79·8	—	23·14	13⅔	120‡	345⅛	65⅓	145⅓	44⅓
'21 ...	24⅓	32¼	29	34·83	—	9·4	5 11/16	112½	118⅓	40¼	145†	27⅝
'22 ...	25⅙	34⅞	24⅝	24·16	—	12·10	8	95	84⅞	33⅕	57‡	30¾
'23 ...	28 13/32	32 13/32	28	25·13	—	15·25	10	83⅜	84½	33¼	57	26
'24 ...	35 11/16	27½	22 3/32	23·38	—	16·26	11·03	120	104½	44	81	31¾
'25	37 7/16	29⅝	16 15/16	20·08	—	12·64	11·01	92⅕	120¾	46⅛	89¼	49 9/16
'26 ...	32⅛	**30 7/24	**16 5/24	18·59	—	9·40	7·75	65	72 15/16	43	74⅝	43⅞
'27 ...	25 9/16	23 1/16	14 13/16	17·80	—	9·54	8·27	95 11/16	74 11/32	43⅜	66 5/16	32¾
'28 ...	22 5/16	21 7/16	13 11/32	15 67	—	10 92	8 66	98½	91 15/16	37 11/16	63 13/32	33 13/16
'29 ...	24 11/32	23⅜	15 7/32	16·13	—	10·26	7·73	76 7/16	71 7/32	37 7/32	61	32
'30 ...	19½	24 13/16	14 7/32	16 64	—	7 49	5·12	53⅛	60 7/32	26½	48 7/32	20
'31 ...	14 9/32	24⅜	13¾	15 98	—	5·90	4·60	36	35 9/16	18¾	27½	15 15/16
Average 1904–13	15⅝	18⅛	11⅞	11⅞	—	6½	5	32½	36⅞	30⅜	31⅜	18⅞
1890–99	12	17½	10⅜	10⅜	—	4¼	3	27	27	26½	25	12½
'78–87	14	16¼	8⅝	9	—	6	4¼	33	34	35½	26½	15
'67–77	20½	22	12½	12½	—	9	6¾	46	48	43	35	19
	Index-Numbers (or Percentages) of Prices, the Average of 1867–77 being 100.											
1873 ...	117	145	—	167	989	100	92	97		101		95
1911 ...	70	81	—	91	654	78	89	86		68		107
'12 ...	89	99	—	102	771	72	79	82		81		111
'13 ...	93	98	—	112	775	78	84	80		89		140
'14 ...	95	97	—	109	693	71	67	76		89		143
'15 ...	117	140	—	136	880	65	64	134		130		111
'16 ...	159	125	—	197	1,109	100	104	172		161		163
'17 ...	158	125	—	217	1,203	183	201	282		243		207
'18 ...	158	153	—	245	1,347	248	253	294		341		207
'19 ...	143	206	—	370	1,538	218	219	313		264		264
'20 ...	195	145	—	638	2,068	257	203	495		270		236
'21 ...	118	147	—	279	1,268	104	86	246		237		145
'22 ...	123	156	—	193	994	134	118	191		116		162
'23 ...	139	147	—	201	1,083	169	148	179		116		137
'24 ...	175	125	—	187	1,105	181	163	239		160		167
'25 ...	183	135	—	161	1,080	140	163	227		174		261
'26 ...	157	138	—	149	1,078	104	115	147		151		231
'27 ...	125	105	—	142	990	106	123	181		141		172
'28 ...	109	97	—	125	860	121	128	203		130		178
'29 ...	117	106	—	129	881	114	114	157		126		168
'30 ...	95	113	—	133	784	83	76	121		96		105
'31 ...	71	112	—	127	700	66	68	76		58		84

* Approximate prices † Approximate. ‡ Nominal. § Best Yorkshire house after 1910.
‖ Now No. 1 Oomra, Fine. ¶ Livonian Z.K from 1921. ** Average price January–April, 1926.
†† Lightnings in 1931 (a) Russian Siretz Group 1, Serb 1 in 1931.

Average Prices of Commodities—Contd.

No. of Article	32A	32B	33	34	27–31	35A	35B	35C	36A	36B	37
	Wool.			Silk.		Hides.			Leather.		Tallow.
Year.	Merino, Port Phillip Average Fleece. d.* per lb	Merino, Adelaide, Average Greasy. d. per lb.	English, Lincoln Half Hogs. d. per lb	Tsatlee † s per lb	Textiles. Total.	River Plate, Dry. d. per lb.	River Plate, Salted d. per lb	Average Import Price. d and dec per lb.	Dressing Hides. d per lb	Average Import Price. d. per lb.	Town s. per cwt.
1873 ...	25	11¾	24½	21¾	—	11	8¼	—	18¼	—	44
1911 ...	17¼	8¾	10	10⅞	—	9¾	7½	7·17	17	17¼	33½
'12 ...	17½	9¼	10½	10⅝	—	10½	8⅜	7·51	17½	17½	33
'13 ...	18	9½	12⅜	11	—	12⅜	9½	8·62	19½	19¼	34⅜
'14 ...	18½	9⅜	12⅝	10⅞	—	13⅛	9½	9·11	21⅛	19¾	31½
'15 ...	21⅜	10⅞	17⅜	9 11/16	—	13	11	10·04	28⅝	21¾	36⅝
'16 ...	32¾	16½	20	16¼	—	14¾	13¼	11·70	28½	27	46¾
'17 ...	46½	23¼	20⅞	21½	—	20	16	15·52	35	34½	62¼
'18 ...	47¼	23½	18¾	25¾	—	20⅛	13⅞	15·9	32¾	32¾	81⅞
'19 ...	67	32⅛	22⅝	26	—	22½	19⅜	17·1	36½	40⅝	87 15/16
'20 ...	79⅞	32	22	38⅗	—	20½	18¼	20·1	43⅗	71¼	75
'21 ...	31⅞	11⅝	8⅗	26 9/16	—	9 11/16	8⅞	9·58	25⅛	46¼	36¼
'22 ...	39	17⅛	9¾	28¾	—	9⅛	8⅞	8 06	24⅓	36	34⅝
'23 ...	43 11/16	20⅓	12	24¼	—	9 15/32	8 3/16	8·23	23 7/16	31 7/16	36⅜
'24 ...	53 7/16	25½	18⅞	23 7/16	—	10 3/64	8⅝	8·63	22 13/16	33⅞	42⅛
'25 ...	41 1/16	17⅜	17⅙	18⅛	—	11 7/16	8 13/16	9·87	23	33	42¼
'26 ...	36½	16 7/16	15	15 13/16	—	10 5/16	8	9·32	21⅕	35 11/16	38⅛
'27 ...	38 1/16	17 7/16	15 11/32	15 7/16	—	12 5/16	10 7/16	9·85	22 15/16	36 15/16	33⅞
'28 ...	37	17 5/16	17 29/32	14	—	15 7/16	11 29/32	12·09	23 13/16	37 7/16	36 15/16
'29 ...	35⅜	13 1/32	16 1/16	13⅞	—	10 9/16	8¼	10·80	19¼	38¼	36 11/32
'30 ...	18 9/32	8 13/32	10¾	10 15/16	—	6 25/32	6½	7 80	18½	33½	28 23/32
'31 ...	14·7	7·1	8½	8 15/16	—	5½	5 9/10	6·12	17¾	32½	19⅓
Average 1904–13	17⅜	9	10⅞	11¾	—	9⅝	7½	6⅞	16	17	31½
1890–99	13½	6½	10	11½	—	6¼	5½	5	13¼	13¾	25
'78–87	18⅛	8⅜	11¾	15	—	8⅝	6¾	6½	15	17	35½
'67–77	21¼	9⅞	19¾	23	—	9	7	6⅞	16	18¾	45
	Index-Numbers (or Percentages) of Prices, the Average of 1867–77 being 100.										
1873 ...	118	—	124	95	822	120	—	—	114	—	97
1911 ...	83		51	47	609	106			99		74
'12 ...	86		53	46	610	114			101		73
'13 ...	88		63	48	670	133			112		76
'14 ...	90		64	47	647	139			118		70
'15 ...	104		88	43	739	149			145		81
'16 ...	159		101	71	1,031	174			160		104
'17 ...	219		106	94	1,535	225			200		139
'18 ...	222		95	112	1,772	218			188		182
'19 ...	315		114	113	1,820	258			222		195
'20 ...	359		111	168	2,099	257			330		167
'21 ...	140		44	115	1,117	123			205		81
'22 ...	180		49	125	1,075	114			174		77
'23 ...	206		61	105	1,121	113			158		81
'24 ...	254		96	102	1,362	119			163		94
'25 ...	188		87	79	1,319	132			161		94
'26 ...	170		76	69	1,063	121			164		85
'27 ...	177		78	67	1,045	142			172		75
'28 ...	174		91	61	1,086	172			176		82
'29 ...	156		81	60	976	129			166		81
'30 ...	86		54	48	669	92			150		64
'31 ...	70		43	39	504	77			146		43

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* Port Phillip fleece washed nominal since 1895, exactly in proportion with the value of clean wool.
† Common New Style from 1921.

Average Prices of Commodities—Contd.

No. of Article	38	39	40A	40B	41	42	43	44	45A	45B	35—15	20—45	1—45
	Oil.			Seeds.	Petroleum.*	Soda.		Indigo.	Timber.		Sundry Materials.	Materials.	
Year.	Palm.	Olive.	Linseed.	Linseed.	Refined.	Crystals.	Nitrate of Soda.	Bengal, Good Consuming.	Hewn, Average Import Price.	Sawn or Split, Average Import Price.	Total.	Total.	Grand Total.
	£ per ton.	£ per ton.	£ per ton.	s. per qr.	d. per gall.	s. per ton.	s. per cwt.	s. per lb.	s. per load.	s. per load.			
1873 ...	38	43	32	62	15¼	100	15½	6¾	65	62	—	—	—
1911 ...	34½	50	42¼	70	5⅜	57	10	3	38	57	—	—	—
'12 ...	33	48	35¼	60	8¼	53	11¼	2¾	41	60	—	—	—
'13 ...	35¼	49½	24¾	45½	8½	47½	11½	2¾	40	63	—	—	—
'14 ...	37¾	50¾	24⅞	48⅝	7 9/16	47½	10⅞	5¾	41¾	64½	—	—	—
'15 ...	34 11/16	51⅞	30⅛	57⅜	8 15/16	48⅛	12⅝	13⅜	58⅞	94¼	—	—	—
'16 ...	44½	59¼	41¼	80¼	12	78¾	17⅞	13⅜	82⅛	148½	—	—	—
'17 ...	46	115¾	56½	112¼	16⅛	89¾	25	10¼	97⅝	210	—	—	—
'18 ...	44⅞	198⅙	63½	131⅛	21⅜	82¾	27¼	9	107⅜	271	—	—	—
'19 ...	69 7/16	200†	92¾	139¼	17⅜	118⅛	24⅞	9⅛	137½	232½	—	—	—
'20 ...	69¾	200†	88⅕	157	25⅓	150⅕	24¾	14½	119⅘	261⅞	—	—	—
'21 ...	36 15/16	80†	31 15/16	72 7/16	22 1/16	140	18 15/16	11 7/16	68¾	156 13/16	—	—	—
'22 ...	34⅕	75½†	39⅕	75½	15 5/16	123	14⅓	9⅝	46⅝	117½	—	—	—
'23 ...	36¼	66 9/16	42 15/16	77⅝	13	103	13 7/16	7½	48	131⅛	—	—	—
'24 ...	40 3/16	79 15/16	42⅝	81 1/16	13⅛	101¾	13⅝	6 1/16	49⅘	122	—	—	—
'25 ...	40⅝	73⅔	43¼	80 5/16	13⅛	100	13⅜	5¾	47 15/16	122 15/16	—	—	—
'26 ...	37⅝	79 9/16	32⅛	63 7/16	13	100	13¼	5⅝	48 29/32	107	—	—	—
'27 ...	34¼	102⅝	31¾	64 5/16	13	100	12 9/16	5½	45 7/16	107 9/16	—	—	—
'28 ...	35¾	80 7/16	29⅞	66 15/16	11 11/16	100	10 11/32	5½	45⅞	111 5/32	—	—	—
'29 ...	34 21/32	72	35 15/32	74⅛	12¾	100	10¼	5½	44¾	107 21/32	—	—	—
'30 ...	25¼	52⅛	36⅝	61 15/16	12¾	100	9 27/32	5½	44½	102 1/16	—	—	—
'31 ...	19 7/16	53 9/16	18 3/16	38⅞	11¼	100	9⅛	5½	37·60	83⅜	—	—	—
Average 1904–13	31¼	43¾	26⅝	49½	6⅝	60	10⅝	3	38	56	—	—	—
1890–99	24½	35	19¼	38	5⅛	53	8¼	4⅜	40	45	—	—	—
'78–87	32½	40	23	46	6⅞	62	12½	6	47	47	—	—	—
'67–77	39	50	30	60	12½*	92	14	7¼	60	54	—	—	—
	Index-Numbers (or Percentages) of Prices, the Average of 1867–77 being 100.												
1873 ...	97	86	105		122*	109	110	92	111		1,163	2,974	5,011
1911 ...	88	100	125		43	62	71	41	83		892	2,155	3,586
'12 ...	85	96	106		66	58	80	38	89		906	2,287	3,831
'13 ...	90	99	78		68	52	82	38	90		918	2,363	3,826
'14 ...	84	101	82		61	52	78	80	93		958	2,298	3,832
'15 ...	89	104	97		71	53	90	184	134		1,197	2,816	4,844
'16 ...	114	119	135		96	86	128	183	202		1,501	3,641	6,117
'17 ...	118	231	187		129	98	178	142	270		1,917	4,655	7,866
'18 ...	115	396	216		170	90	194	124	332		2,225	5,344	8,651
'19 ...	178	400	258		138	128	177	126	325		2,405	5,763	9,278
'20 ...	179	400	272		203	164	177	200	335		2,684	6,851	11,298
'21 ...	95	160	116		177	152	135	158	198		1,600	3,985	6,991
'22 ...	89	151	127		122	134	102	128	143		1,361	3,430	5,895
'23 ...	93	133	134		104	112	96	103	157		1,284	3,488	5,806
'24 ...	103	160	138		105	111	97	84	151		1,325	3,792	6,267
'25 ...	104	147	137		105	109	96	79	150		1,314	3,713	6,142
'26 ...	96	159	106		104	109	95	78	137		1,254	3,395	5,662
'27 ...	88	205	107		104	109	90	76	134		1,302	3,337	5,503
'28 ...	92	161	108		94	109	78	76	138		1,286	3,232	5,396
'29 ...	89	144	122		102	109	73	76	134		1,225	3,082	5,178
'30 ...	65	104	110		102	109	70	76	129		1,071	2,524	4,350
'31 ...	51	108	63		90	109	65	76	106		934	2,138	3,677

* Petroleum average, 1873–77.

† Nominal.

MISCELLANEA.

The Third Census of Production of the United Kingdom (1924).

By Henry W. Macrosty.

The publication of the Final Reports on the Third Census of Production, taken in respect of the year 1924, has now been completed in five octavo volumes, viz., The Textile Trades (price 4*s.* 6*d.*); The Food, Drink, and Tobacco Trades and the Clothing Trades (5*s.* 6*d.*); The Iron and Steel Trades, the Engineering Trades, and the Non-ferrous Metals Trades (7*s.*); The Chemical and Allied Trades, the Leather, Rubber, and Canvas Trades, the Paper, Printing, and Allied Trades, and Miscellaneous Trades (7*s.*); Mines and Quarries, the Timber Trades, Manufactures of Clay, Stone, etc., the Building and Contracting Trades, Public Utility Services, and Government Departments (7*s.*). The examination and tabulation of the returns received in connection with the Second Census of Production (1912) were interrupted by the European War, but such of the material as proved to be satisfactory has been incorporated with the reports for the Third Census. Comparison of results can thus be made, as a rule, only for the First (1907) and the Third Censuses, and in the interval of seventeen years the scale of values altered so greatly as a result of the financial operations of 1914–19 that the money figures are in no wise comparable. No General Report has been prepared for the Third Census as was done for the First, but the fifth of the volumes now under notice contains an appendix of general statistical tables which, with Mr. Flux's presidential address (*Journal*, Part I, 1929), may serve the purposes. From these tables we propose to make some excerpts. First will conveniently come a contracted general survey, on which we may premise that "net output" is the surplus of the value of gross output over the cost of materials and work given out and that "mechanical power available" includes electric motors driven by purchased electricity as well as prime movers installed in factories.

In comparing the totals for 1907 and 1924 it should be remembered that the present Irish Free State was included in the United Kingdom in the former year but not in the latter.

Tables II, III, IV, and V relate to classification of employees and their attendance. The numbers of persons employed, as shown

Summary of Results for 1924 *and* 1907.

Trade Group.	Gross Output.	Net Output.	Persons Employed	Net Output per Person Employed	Mechanical Power Available.
	£ mill.	£ mill	Thousand	£	Th H P
Textiles	757·3	219·2	1,256	175	2,746
Food, Drink, and Tobacco ...	728·0	280·0	516	542	681
Clothing	229·5	105·5	681	155	187
Iron and Steel...	319·8	110·2	558	197	2,752
Engineering	401·7	199·2	993	201	1,773
Non-ferrous Metals	95·6	26·3	123	214	269
Chemicals	226·8	77·6	207	375	620
Leather, Rubber, etc. ..	76·9	26·5	114	232	197
Paper, Printing, etc. ...	165·4	96·5	360	268	483
Mines and Quarries	276·0	227·6	1,289	177	3,863
Timber	79·6	37·9	204	186	287
Clay, Building, etc.	271·2	145·1	742	196	625
Miscellaneous	42·9	22·1	96	231	95
Public Utility Services, etc. ...	292·2	169·8	753	225	6,871
Total : United Kingdom, 1924	3,962·9	1,743·5	7,892	221	21,449
Total : United Kingdom, 1907	1,765·4	712·1	6,985	102	10,749*

* Prime movers only.

in the preceding table, are the average numbers of operatives employed during the year and the administrative, clerical, and technical staff as at October 18, 1924. On that date the operative staff numbered 7,218,500 persons and the staff 775,600 persons, or 7,994,100 in all, the number of operatives being 1·44 per cent. above the yearly average. Operatives included 5,390,800 males and 1,827,700 females, 9·45 of the former and 23·26 of the latter being under eighteen years of age. In addition to the persons engaged in or about factories and workshops, 49,461 outworkers (36,723 females) were employed in 1924, a great reduction from the 102,147 employed in 1907; of the 1924 total, 31,983 (22,178 females) were in the clothing trades. The Census of Production Act does not allow any particulars to be compulsorily obtained with regard to wages, but Table VI summarizes the information voluntarily furnished to the Ministry of Labour in 1924 by a large number of firms (not including public utility services and Government Departments). Those firms employed about 4,330,600 operatives, or 61 per cent. of the trade total, and their aggregate net output was about £1,040·9 million or 66 per cent. of the respective total. The aggregate amount of wages paid was £523·4 million or 50·3 per cent. of the net output of the same firms. Wages in relation to net output varied from 16·8 per cent. in the food, drink, and tobacco trades (where taxes come into account) to 77·7 per cent. in mines and quarries (where materials are low); in textiles the percentage was 50·8, in iron and steel 61·0, and in engineering 54·7.

The next six tables deal with power and fuel. Excluding electricity undertakings, the percentage of power available not in use in 1924 was 15·6 for prime movers, 28·1 for electric generators, and 14 per cent. for electric motors. Practically half the power available, which was equal to 2·2 horse-power per head of the average number of operatives employed, was applied electrically. Particulars are also given (so far as furnished) of the use of electricity for other purposes than power.

Table XIII deals with the number of returns received. Table XIV shows the distribution of industry in eleven geographical areas, and Table XV classifies the results according to the size of the firm making a return. These three tables deal only with firms employing more than ten persons on the average, but the returns from those firms cover 92·6 per cent. of the total number of persons employed. The total net output covered by these tables was £1,639 million (94 per cent. of the total) and of this sum the Lancashire area provided £311 million and Greater London £305 million. Firms with 1,500 employees or more furnished £438 million of net output, the next largest groups being: 100–199 employees, £213 million, and 50–99 employees £164 million. The number of returns received from the first class was 600, from the second 6,500, and from the third 10,200, but these numbers are subject to some qualifications, for on the one hand a firm could make a combined return covering all its establishments and, on the other hand, where a firm was engaged in more than one Census trade, separate returns were generally required for each trade. Consequently it does not follow that in all cases "firm" and "return" are identical, and in Table XV "size of firm" simply indicates the number employed as shown in a return.

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1.—*The Methods of Statistics.* An Introduction mainly for Workers in the Biological Sciences. By L. H. C. Tippett, M.Sc. (Lond.). $8\frac{1}{2}'' \times 5\frac{1}{2}''$. 222 pp. London: Williams and Norgate, 1931. 15*s.*

The application of statistical principles to biology has undergone an enormous development in the last ten years and there has ensued, in consequence, a considerably increased demand among biologists for statistical knowledge. The type of biological reader the author has in mind is one who has but slight mathematical attainments, algebra up to the binomial theorem and the elementary notions of the calculus, and who even without these should be able to arrive at an appreciation of the arguments used. Proofs are not as a rule given. R. A. Fisher's *Statistical Methods for Research Workers* was the first work of this *genre*, and the author has obviously been much influenced by Fisher's teaching, but there is plenty of room for his own exposition.

The book starts with some very good examples of different types of frequency distribution and we are rapidly introduced to the classical measures of location (mean, median, and mode), dispersion, and skewness. Among measures of dispersion the range or interval between greatest and least values receives more attention than has hitherto been customary in text-books. After some examples on fitting the binomial, the Poisson series, and the normal curve, we come at once to a chapter on the theory of random sampling. This deals with large-sample theory, small samples being reserved for a later chapter which explains clearly the method of testing the significance of the deviation of the mean or the variance of a small sample from some hypothetical value and the significance of the differences between two means or two variances. The remaining chapter in the first section of the book is devoted to a good discussion of χ^2 and its applications.

The remainder of the book is based on the analysis of variance; we are first introduced to the simple case where our data can be arranged in classes so that it is possible to compare the amount of variation from class to class with the amount within classes, and association is first regarded from this point of view; for example, there is an association between the length of the cuckoo's egg and the type of nest in which it is found if the variation of egg length among eggs in the same nest is less than the variation in length for nest to nest. Testing the significance of the correlation-coefficient, the correlation ratio, the multiple correlation coefficient, the successive coefficients of a fitted polynomial or of linearity of regression are then treated as particular cases of the test for comparing two independent estimates of variance. It is surprising what a number of different processes are thus co-ordinated as simple examples of one principle.

In spite of his enthusiasm for this method of presentation the author does not forget to point out the limitations imposed on the application of these tests for significance by two assumptions on which they are based, the *normality of the dependent variable* and *the constancy of the residual variance* for different values of the independent variable. Fortunately there is evidence that moderate skewness is not an important modifying factor. Of course testing the significance of the difference between two non-zero correlation coefficients lies outside the scheme but the appropriate transformation is clearly explained. The relation between the intra-class correlation-coefficient and the correlation ratio is also more clearly indicated than in any other text-book we have seen.

For the first time in a text-book, too, appears an account of the analysis of covariance. When our data are arranged in a number of classes, then just as it is possible, for one variate, to split up the sum of the squares of the deviations from the general mean into two portions respectively due to differences within and between classes, so the sum of the products of the deviations from their general means of two variates may be similarly treated. Hence we may calculate correlation coefficients between values of the variates in the same class or between the means of classes. The former is a valuable way of eliminating class differences. The connection between this process and the ordinary method of partial correlation is carefully explained.

There is a useful chapter on the principles of experimental arrangement and the book closes with a particularly interesting example. Fifty groups of varying numbers of cotton hairs were weighed, and each group was subsequently divided into three groups A, B, C according to the appearance of the hairs under the microscope. The number of hairs in A, B, C separately was known but not the separate weights. It was desired to find whether the average weights in A, B, C were significantly different. The problem is solved by an ingenious application of the test for significance of regression equations.

This is a book which may be unhesitatingly recommended to biologists and, indeed, to all working in statistics. J. O. I.

2.—*Mathematische Volkswirtschaftslehre. Eine Einführung.* Von Otto Weinberger. 9″ × 5¾″. xiv + 241 pp. Leipzig und Berlin: B. G. Teubner, 1930. 18 *Rm.*

In this book Dr. Weinberger has provided a very useful work of reference for mathematical economists who have read fairly widely in their subject. In particular, reference is made, in the text or in the numerous footnotes, to most of the important books and papers published since the war in Germany, Austria, and elsewhere. But Dr. Weinberger's object, as he states in his preface, was to give a readable *introduction* to the subject of mathematical economic theory, and in this respect it cannot be said that he has succeeded. The reader who approaches the subject for the first time, whether from the mathematical or from the economic angle, requires a survey of the main achievements of the mathematical method in economics, a non-detailed description of the mathematical methods used, and an account of the general principles and fundamental concepts on which the theories are based. In these respects he will find Dr. Weinberger's book inadequate. The general principles and main achievements of mathematical economics are lost in masses of detail, and, in particular, the account of the general theories of exchange and production developed by Walras and Pareto is extremely short and disconnected. Further, the mathematical methods themselves are presented in an unattractive form which does less than justice to the original authorities.

The general plan of the book is admirable. There are two main sections, the first devoted to the historical development and the second to the main problems of mathematical economic theory. To these sections are added an introductory section on the justification of the mathematical method in economic theory and a short concluding section on graphical statistics as applied in economics. It should be noticed, however, that this plan, except for the concluding section, has been adopted before (cf. Moret's *L'emploi des mathématiques en économie politique*). The main disappointment lies in the author's development of the two main sections. In the historical section, an undue amount of attention is paid to the two early German writers, von Thünen and Gossen, while in the following section the author considers six pages sufficient for the static problems of economic equilibrium, the Paretan equations for exchange and production being written down with little or no discussion.

In detail there are some surprising omissions. In the chapters devoted to population problems (pp. 125–34), no reference is made to the logistic law of population growth introduced by Verhulst, Reed, and Pearl; elasticity of demand (pp. 146–7) is defined by means of Marshall's secondary geometrical property and no analytical definition or economic meaning is given to the concept; two chapters (pp. 176–86) are allotted to Moore's treatment of the dynamic problems of economic equilibrium in *Synthetic Economics*, but only footnote reference is made to the work on the same subject by Roos and Evans. Finally, Dr. Weinberger has neglected or ignored several important writers, including Wicksell and Barone, and all the contributors on the subject to the *Economic Journal* since Edgeworth. A disappointing book. R. G. D. A.

3.—*New Survey of London Life and Labour.* Vol. II. London Industries, I. 8½″ × 5½″. xv + 492 pp. London: P. S. King, 1931. 17*s.* 6*d.*

Charles Booth devoted five volumes to the study of London's industrial life. The plan and limits of the New Survey have imposed the necessity of a good deal of compression and omission, since it is proposed to cover this section of the ground in two volumes only, of which this volume is the first. It deals with the two largest groups of London industries principally carried on by male labour—viz. Building and Works of Construction, and the Engineering and Metal Trades; the largest women's industry—Domestic Service; and the most important casual occupation—Dock and Port Labour. It also includes the Clothing, Boot and Shoe, Furnishing and Woodworking trades, which (together with dock labour) formed the main constituents of the group of industries designated by Charles Booth as "East London trades connected with poverty." These industries, though important and typical, employ less than half of the working population of London. For this reason any comprehensive summary of the conditions and tendencies of London industries as a whole is reserved for a later volume, when the whole of the data will have been reviewed.

The investigator's lot has been in some ways a much easier one than in Charles Booth's day. There are many more official sources of information, *e.g.* the statistical returns compiled by the Ministry of Labour and the Home Office, and in particular, it is stated, "the Unemployment Insurance Statistics have been a veritable mine of valuable information." The latter, for instance, have enabled an interesting analysis to be made, by industries, of the magnitude of the units of employment, for which no previous figures are available. It shows that "in Greater London the employers of ten or more insured workers number rather more than 21,000; that their average number of insured employees is about 66; that half of them employ less than 25 insured workers, three-quarters of them less than 50, and nine-tenths of them less than 100. Only 34 separate undertakings in the whole of Greater London employ over 2,000 insured workers apiece."

The most fundamental change, which has profoundly modified the whole industrial structure of the country in the past forty years, has, naturally, been the persistent progress of mechanization, with all its concomitant effects. "The progress of this mechanical evolution has left its mark on all departments of life and labour. It is fast making obsolete the old bipartite distinction between skilled and unskilled labour, and a graduated series of specialized process workers are becoming the most characteristic figures in mechanical industry. The altered view of what constitutes skill is bringing with it changed conceptions as to the kind of training needed for industry and the conditions under which such training can best be given. Meanwhile the enlargement of the industrial unit, the greater subdivision of labour, and the increased amount of repetition work—all of which are direct consequences of greater mechanization—have opened up new possibilities for the employment of women and juvenile workers, and have incidentally raised difficult problems for the craftsmen. The development of mass production on a mechanical basis has likewise stimulated the use of systems of remuneration based on payment by results, and (generally speaking) has brought with it more regular employment and a diminution of casual labour." How far these alterations have affected the particular industries surveyed in this volume is discussed in detail, both for the industries as a whole and for their various subdivisions. The factors surveyed include the scale and general organization of each industry, the fluctuations of employment, long-term and seasonal, the various aspects of unemployment, wages and hours, the increasing tendency to piece-work methods of payment, welfare work, and Trade Boards. Special sections are devoted to the trade organizations of both employers and employees and their effects upon such things as rates of pay and conditions of labour, and to the training and recruitment of new entrants. Already in Charles Booth's time the system of apprenticeship was breaking down. Mechanization has considerably hastened the process and produced an intermediate class of semi-skilled workers who for the most part obtain their training, not by any system of ordered apprenticeship but by progressing up a "ladder of progressively complex processes." On the other hand, the statistics collected show the steadily growing importance of technical instruction as an element in industrial training.

This limited summary is sufficient to show how comprehensive a field the New Survey is covering. The only official statistics to which there is a noticeable absence of reference are those in which the vital statistician is particularly interested, data relating to occupational mortality and, where available, morbidity. For instance, it is stated that "painting is liable to be an unhealthy job at the best of times, and though much has been done of recent years to diminish its dangers they have not yet been entirely eliminated" (p. 104). Reference to occupational mortality returns and to the

Home Office statistics of cases under the Workmen's Compensation Acts could place this statement on a much more precise basis. The 1921–23 Occupational Mortality Supplement of the Registrar-General shows that from all causes of death painters and decorators suffer mortality differing little from the average at any age. On the other hand, they have high rates from chronic nephritis and cerebral hæmorrhage, no doubt associated with their lead risk. Similarly, the risk of fatal accidents amongst dock labourers can be shown more precisely than in the comment, " they are more exposed to overstrain and accident " (p. 418), though in this case, it is true, statistics of Workmen's Compensation have been utilized. With regard to the domestic servant, the conclusion that she is a " more remunerative client for health insurance societies than any other group of women workers, a striking tribute to the relative healthiness of the calling," scarcely suggests a critical enough attitude towards the difficulties of interpreting recorded sickness rates.

Not the least valuable part of this volume is the investigators' accounts of the industrial processes themselves and the changes in them that have taken place, *e.g.* the effect upon carpenters and joiners of the introduction of all metal window-frames. This information has been collected skilfully and put together in such a way as to produce a valuable commentary on these particular industries. In general few readers will fail to find this an interesting volume. A. B. H.

4.—*The Declining Birth-rate in Rotterdam.* By J. Sanders, M.D. 10″ × 6½″. xii + 181 pp. The Hague: Martinus Nijhoff, 1931. 6 guilders. (In English.)

Dr. Sanders, unlike most statisticians, has suffered under no dearth of material. He has had at his disposal nearly 25,000 family registration cards on which were recorded the profession of the father, the year of birth of the father and mother, the year of their marriage, their religion, the year of the wife's death, the years in which children were born and died, and the children's religion. This forms an excellent brief, and it is the greater pity that the case is presented neither very clearly nor very attractively. For instance, the first three chapters deal with the number of children born to parents of various professions and religions. But in these chapters marriages of any duration, completed or incompleted as regards fertility, are all lumped together. It is impossible to interpret the differences unless we know that the proportion of complete to incomplete marriages does not differ in the various groups. It is not till Chapter IV that the author divides the data according to year of marriage. The incomplete marriages do not assist his arguments and the facts would have been put in much clearer light if they had been left out altogether from most of his tables.

Comparing marriages contracted between 1879 and 1893 with those between 1904 and 1913, he finds the number of children born has declined by 19 per cent. amongst the " higher intellectuals " and by approximately twice as much amongst shopkeepers, skilled and unskilled labourers. The differential birth-rate is being evened out.

The differences apparent in the rate of increase over a series of years in the number of sterile marriages in the several occupational groups he regards as a proof of the "volitional control of birth," since if it were a biological phenomenon the increase should be the same for all the groups. Apart from the fact that we do not know whether the age at marriage is changing differentially as regards the occupational groups, this evidence hardly seems conclusive. It is not impossible that the biological factor, *e.g.* some diet factor, might have become operative amongst the higher social classes at an earlier date than amongst those lower in the scale. Further evidence of deliberate birth control he adduces from the fact that after a child's death, especially in small families, the vacancy is filled more quickly than in cases when there has been no decease. The problem of whether lactation has any effect upon the risk of a subsequent pregnancy would have an obvious bearing here.

No religion seems able to check the drop in the birth-rate—"the Church loses its influence at the threshold of the bedroom" is Dr. Sanders's conclusion. The Calvinists and the Roman Catholics have, it is true, the highest birth-rate at nearly all periods, but even in their case there has been a very substantial decline in the size of the family over the last fifty years. The author's general thesis is opposed to Brownlee's arguments in favour of a lowered fertility. Deliberate birth control is his contention. But to regard, as he apparently does, a lowered fertility as racial degeneration and deliberate birth control as no such thing is a confusion of terms. Birth control, *e.g.* when economic circumstances do not demand it, might by many persons be regarded equally as evidence of racial degeneration.

Some interesting statistics are given with regard to "compulsory" marriages, while a great deal of the original material is given in fifty pages of tables. Workers on these and similar problems may find this of considerable value. The analysis has been made with assistance from the International Union for the Scientific Investigation of Population Problems. A. B. H.

5.—*Change of Interests with Age.* By Edward K. Strong, Jr., Professor of Psychology, Graduate School of Business, Stanford University. 8¾″ × 5¾″. xix + 235 pp. Stanford University Press. London: Humphrey Milford, Oxford University Press. 1931, *24s.* net.

"The work presented here was prepared not only to throw light upon the problems of later maturity, but also to determine how changes in interest due to age may affect that phase of vocational guidance which is based upon the interests of young people. If interests change from year to year, they are not trustworthy guides to the choice of a career. If they do not change greatly, then they may be safely so employed. It is possible to conceive that interests may change rapidly up to a certain age and from then on change relatively little. If this is so, then guidance based on interests would be possible during the later period of life but not in the earlier period. Wise vocational guidance in terms of interests depends upon the answers to the vital questions: How much do interests change? and, At what age do changes take place?" (p. 3).

The logic is indisputable; the third vital question is, How are we going to set about solving these problems? Professor Strong adopts the fashionable method of the questionnaire, or, as he prefers to call it, the Vocational Interest Blank. The present example contains a modest 420 items, to each of which "the individual reacts," by indicating whether he likes, is indifferent to, or dislikes it. The "reactions" demanded involve 100 occupations, ranging from poet to statistician (the poet wins), from floor-walker to state governor (the floor-walker is left at the post); 54 amusements, *e.g.* chess, chopping wood, "rough house" initiations, and snakes (? amusement); 39 school subjects, varying from calculus to music; 82 "activities," a heading broad enough to cover pursuing bandits in a sheriff's posse (only 19 per cent. of the population *really* enjoy this); studying the latest hobby, *e.g.* Einstein theory, Freud, etc.; climbing along the edge of a precipice (considerably more popular than pursuing bandits); and acting as a yell-leader (negatively correlated with age). It might prove a little difficult to decide whether one liked, disliked, or was indifferent to "buying merchandise for a store" (perhaps it depends upon the scale, merchant prince or our Mr. Brown), but to the 63 peculiarities of people—people with gold teeth or hooked noses, people who do not believe in evolution or who chew gum—one's reactions would be *quite* definite. The form concludes with 42 "miscellaneous" items, such as preference for a head waiter or a lighthouse tender, fat men versus thin men, nights spent at home and nights spent away from home; and, finally, 40 modest estimates of present abilities and characteristics—"usually liven up the group on a dull day," "have more than my share of novel ideas," "win confidence and loyalty" (it is a touching thought that 84 per cent. of gentlemen of mature age inspire these latter feelings).

2,340 men between the ages of twenty and sixty years were bold enough to submit to this test. It is perhaps not surprising to find that 70 per cent. of them think psychology is a nice school subject and that cowboy movies are not quite so attractive. Elaborate measures are developed for "scoring" their replies and the report is liberally sprinkled with σ, η, and χ^2. In fact, a lot of work can be done on 420 questions. The upshot of it all is that there is a relatively small (though significant) change in interests with age. Differences as represented by occupational interests are very much greater than differences due to age.

So now we can get on happily with vocational guidance.

A. B. H.

6.—*The Agricultural Situation in* 1930–31. International Institute of Agriculture. $9\frac{1}{2}'' \times 6\frac{3}{4}''$, 426 pp. Rome: Treves, Treccani, Tumminelli. 1932. Lire 25.

This useful publication is described as an "Economic Commentary on the International Year-Book of Statistics," but this sub-title hardly does justice to the wide scope of the Review, which is an attempt—and, on the whole, a successful attempt—to summarize the chief economic factors, which in the last few years have affected agriculture in the principal countries of the world. It brings out the extraordinary diversity of the questions which arise when agriculture is looked at from an international point of view—a diversity which is apparent when it is remembered that agriculture covers products ranging from wheat and live-stock to sugar, coffee, cotton, and rubber, while in addition each country, either as producer or consumer, has its own separate and often conflicting national interests. This complexity of subject is met as far as possible by dealing in the first place with some of the wider aspects of the agricultural situation and with the position as regards different crops, and then by detailing country by country the measures of assistance or relief taken by the respective Governments, the voluntary action taken by producers through co-operative and similar organizations, and finally by a summary of the principal features of each country's trade in agricultural products.

The first section of the Review is devoted to a study of "The Development of the Agricultural Crisis," in which the writer, who, it may be noted, is Dr. George Pavlovsky, a member of this Society, discusses the influences—debts and reparations, the concentration of gold, and the development of economic particularism—which as part of the general economic situation form the background of the present agricultural depression. While allowing full weight to the influence of monetary conditions in earlier years, he suggests that in 1930–31 these only played a secondary part, "the monetary movements themselves being only results of a series of independent causes responsible for the want of balance in the world economy." He rightly points out that while closely linked with the general economic crisis and sharing with it certain of the most important factors, the agricultural depression has also specific causes which in the case of certain products take the form of over-production (or more correctly over-supply) in relation to demand.

Following on this general examination of the situation, attention is given to the position of wheat, which for many countries constitutes the hard core of the agricultural problem. In 1930–31 a distinct increase in world wheat production and in the stocks in the principal exporting countries resulted in a sharp fall in prices, which brought them much below the already low level of the previous season. In attempting to protect their producers against the disastrous consequences of these uneconomic prices, different countries pursued very different policies, but followed in the main the lines adopted in the previous year. In the grain-importing countries, further attempts were made to help home production by means of customs protection, by restrictions on the use of imported grain and other similar methods, while exporting countries continued their experiments in organizing the marketing of produce (*e.g.* through the Federal Farm Board and the Canadian Wheat Pools) or in reducing costs of production. There was, however, little effort to adjust production to prices, and it was only a year later, in 1931–32, that any reduction in the wheat area became apparent A special feature of 1930–31 was the effort made to find a solution of the wheat problem and of other agricultural difficulties by some form of international agreement; numerous conferences were held both by groups of countries and on the initiative of the League of Nations and of the International Institute of Agriculture, which discussed the elimination of obstacles to trade, the regulation or control of marketing, or more specifically the disposal of the grain surplus; but so far as wheat was concerned " they only served to throw into relief the essential differences in points of view, and seemed to show that a limitation of the supply on the world market by means of quotas more or less rigidly fixed required a unanimity which was unattainable." Although these conferences, which are described in a separate section of the Review, did not lead directly to any practical result, they are of importance as showing a recognition of the possibility of concerted international action much in advance of anything previously attained.

Another section is devoted to a summary of the conditions of supply and demand and the movement of prices of cereals, sugar, coffee, tea, cocoa, wine, olive oil, cotton and other textiles, rubber, and live-stock, and live-stock products. The prices on the principal markets for each product are given in this section on a comparative basis by means of index-numbers calculated from gold prices (1926 = 100), and the extent to which the items in this wide group have been affected by the fall in prices is strikingly apparent. In addition, particulars of production are given which show how much markets in recent years have been burdened by high output and heavy stocks. A brief summary is given of the steps taken by producers of sugar coffee, rubber, etc. to limit output or sales. R. J. T.

7.—*Recueil de Statistiques: Basées sur les données de la Comptabilité Agricole*, 1927–8. Institut International d'Agriculture. 13½″ × 10″. xxiii + 412 pp. Rome: Bestetti and Tumminelli. 1931. Lire 80.

This somewhat weighty publication gives detailed agricultural costings in respect of sixteen European countries for the year 1927-8, and is prefaced by an outline of the events which led up to its achievement. A fairly comprehensive list of accounting terms used in the Report is reproduced in twelve languages, and details of methods followed by the co-operating research stations are described. The number of farms treated by each costings centre is indicated, and it is interesting to note that in Germany 2,300 and in Holland 2,000 farms were critically examined, but only one in France; out of the grand total of 8,800, the United Kingdom accounted for 146. These figures are followed by a series of maps illustrating the investigating centres.

The first series of tables gives the various uses to which the land on the farms considered is put, and this is followed by an examination of the capital employed. This information is given in great detail, including land, crops, improvements, buildings, farm-houses, live and dead stock and liquid capital. One hesitates to accept these figures, as given, to the second decimal place, but allowing for this, it appears that the total capital per hectare invested in the average Danish and German farm is nearly three and a half times that of the English holding. Swiss farms appear to be most heavily capitalized. The labour engaged on the farm is indicated with an excess of detail which could have been reduced by, *e.g.*, grouping together the amount of women- and child-labour.

The section giving farm income begins with a table showing quantities sold and the price obtained per unit. In respect of Czechoslovakia this information is available with an almost suspicious particularity. Indeed, the amount of detail is at times disproportionate to its value. Thus, the columns (measuring 39″ *in toto*) dealing with poppies receive four entries over as many pages, while the columns devoted to hops receive no entries at all. The detailed cost of cultivation and capital expenditure are given, both in money and as a percentage of the total outlay for farms and per hectare. The table giving the gross yield of farms according to items of production occupies over twenty pages, and it is felt that considerable economy could have been achieved by grouping together a number of minor items; for example, although separate columns have been prepared in respect of beans and tobacco, only one item appears in each case. The next twenty pages reproduce the same information on a per hectare basis.

The costs of production are given per hectare and per holding, and, excluding interest charges, are analysed in detail on a percentage basis. By comparing this table (E *b*) with the previous one, it appears that at least the figures in the last but two and last but one columns against items 3 and 4 for Holland are incorrect.

Probably the most interesting table of all is that giving the final results, and the inclusion in the same table of the figures on a farm, hectare, and percentage basis is a welcome innovation.

In the second part of this Report, much the same information is given in respect of large holdings; and the index at the end appears to be quite adequate.

This publication contains a great deal of useful information and enables international comparison of agricultural costings to be made for the first time. An enormous amount of work is necessarily involved in publishing a collection of figures such as this, and it is hoped that the Institute, profiting by experience, will effect several considerable improvements in subsequent years. Reference has already been made to the desirability of reducing the size of the tables, and the omitting of certain details. In view of the work involved, perhaps it was inevitable that some delay should occur between the collection and publication of the material, but nevertheless it is hoped that future issues will be published somewhat more quickly.

The reader is warned in the preface against the risk of making *prima facie* comparisons of one country with another, and, if this is borne in mind, this Report has no mean international value.

R. F. G.

8.—*The Profitableness of Farming in Scotland: Report on the Financial Results obtained on Certain Groups of Farms in Scotland in* 1928–9, *with a Statistical Account of the Farms in the Counties of Berwick, Roxburgh, and Selkirk.* 9¼″ × 6¼″. 162 pp. H.M.S.O. 1931. Price 2*s*. 6*d*. net.

This publication is intended to be the first of an annual series and, we are warned, gives greater detail than may be expected from future issues. With the co-operation of the Agricultural Colleges at Aberdeen, Edinburgh, and Glasgow, financial records have been secured in respect of a number of "suitable farmers," and these records have been analysed and presented by the Department of Agriculture.

The first part, dealing with financial results, is largely based on returns received from about 130 farms, which are grouped into four areas, viz. North-eastern, Eastern, Border, and South-western counties, in order to discriminate between the different types of agriculture practised.

For the average farm, the utilization of land, rents, and the livestock carried are described. Of the total receipts of the average cattle-feeding farms (£2,300) 55 per cent. is derived from cattle, crops account for 42 per cent. of the turnover of the arable farm (£7,400); the arable-sheep farm received 39 per cent. of its turnover (£5,500) from sheep; and dairy produce represents 52 per cent. of the total receipts of the dairy farm (£2,800). These proportions are also given in relation to *production*.

Chapter II outlines labour organization and capitalization. It appears that the aggregate capital invested in the average cattle-feeding farm was £6,500 compared with £7,500 for the dairy farm, £17,810 for the arable-sheep farm, and £18,750 for the arable farm. The financial results are briefly summarized in Chapter III, where it is explained that profit or loss was determined on the assumption that the farmer was a tenant, so that where the farm was owner-occupied, receipts and payments relative to ownership were separately recorded. Profit is therefore taken as the reward accruing to the farmer for management and work undertaken by himself and those members of the family not considered as hired workers. Profits have been calculated for the two years 1927–8 and 1928–9 in respect of thirty-three farms, from which it appears that seventeen fared worse in the second compared with the earlier year.

Chapter IV analyses the factors underlying differences in profits. Both production and expenditure are critically examined, together with changes in the price-, and cost-, levels. The arguments where the English agricultural index-number is applied to local Scottish conditions are open to criticism and the warning given on p. 75 could, perhaps, have been emphasized somewhat more strongly. In reducing the Scottish farmer's purchasing power in 1928–9 to the pre-war standard, the Ministry of Labour Cost of Living Index has been used. What items, if any, have been excluded from the Cost of Living Index-number as a whole for the purpose of this calculation are not clearly stated, but some modification certainly seems desirable. Allowing for this criticism there does seem reason to suggest that the dairy farmers of the South-west and the Border sheep farmers have maintained, if not improved, their position compared with that of 1911–13, contrary to the experience of the cattle-feeding and arable farmers. Although only sixteen were considered, it appears that "cheese farms" did best in 1928–9 and the ten "cropping" farms the worst.

The practical implications of this investigation are discussed in Chapter V, where desirable alteration in, or modification of, farm practice is considered in the light of the results obtained.

An appendix containing twenty-three tables of detailed farm accounting records concludes the survey.

Part II gives a general statistical account of the farms in three Eastern Border counties with the object of indicating how far generalizations can be drawn from the accounts which have been investigated. The farms in these three counties as a whole are classified in various ways on the basis of rent per acre, in the light of which size, stock, and crops are examined, but the year to which the first six tables refer is not given in the heading.

This publication is an excellent pioneer work and provides much data by which we may know what is happening on the farm as such. It is hoped that future numbers in this series will be published rather more quickly than this one, so that the existing position may be more readily appreciated. R. F. G.

9.—*The Pound Sterling*, a History of English Money. By A. E. Feavearyear. 9″ × 6″. x + 367 pp. Oxford: Clarendon Press, 1931. 15*s*. net.

The pound sterling has a history of over 1100 years, and out of that long period we can only select a few salient dates for comment. Now "off gold," the pound was originally "on silver" and corresponded more or less to a pound of silver, troy weight. Offa's silver pennies date about A.D. 775, and 240 pennies always went to the pound. William I set up a mint at the Tower and established the "Tower pound," 6¼ per cent. lighter than the Troy pound; money was then coined from an alloy containing 925 parts of pure silver in 1000, the "ancient right standard of England" which endured till 1920. Faulty minting and the activities of the clipper and counterfeiter led to continual debasement of the currency, and between 1100 and 1300 seven recoinages took place. The supply of silver for Europe then began to run short and severe export laws could not keep good money in the country, so, in order to meet the demand for money to cover the expenses of the Hundred Years' War, Edward III was driven to reduce the standard in 1343, 1344, 1346, and 1351. The Black Death, which scourged the country in 1349, swept off a very large proportion of the inhabitants and in the decay of commerce money became superabundant, so that prices rose rapidly and the export of coin increased. Meanwhile, attempts had been made since 1204 to introduce gold coins, but they were too large in denomination for ordinary trade, and the relative value of gold to silver for coinage was seldom accurately fixed, so that the double standard did not work. There was a continual struggle between those whose interests were in a sound domestic currency and the merchants who wanted supplies of bullion for their foreign trade; the King's seignorage, or profit on coining, was often a severe deterrent on currency supplies. Another reduction of the standard took place in 1464, but with very little effect on prices, as the debasement offset the rising value of the precious metals.

Henry VII was a better manager of the coinage than most of his predecessors and minted the first gold "soveraigne" of 20*s.* in 1489. Again a French war drove Henry VIII to debase the currency, for the monastery treasures did not last long at the Mint, culminating in the Great Debasement of 1546, when the coinage alloy contained only 4 ounces of pure silver to the pound. A serious rise in prices took place. Edward VI practised economy and employed Gresham to "peg the exchange" by operations on the wool sales, but the base money could not be called in on account of the expense. Fortunately, the great influx of silver from America caused the metal to fall seriously in price, and after "calling down" the base coins from their Mint value the great recoinage of 1560 took place; £638,000 were paid out for base money and £733,000 of new money coined. Prices now rose with the abundant supply of silver. James I secured for his Mint the coinage of Spanish silver for the Netherlands, and much also passed into circulation in England, only to be immediately exported.

The seventeenth century saw two important changes in the metallic coinage. The first was the invention of the milled edge by Blondeau, which was adopted at the Mint in 1663; the clipper was now finally defeated, but the melter, in the person of the merchant goldsmith, was still active. The second was the abolition of Mint charges in 1666, which led to a very large increase of coining of silver. The century "witnessed also the development of a new kind of currency made of paper and dependent upon credit, a currency subject to such vagaries of fluctuation that the problem of freeing the coinage became overshadowed by the problem of controlling the paper." The reader will do well to supplement Mr. Feavearyear's two chapters, V and VI, with Dr. R. D. Richards's "The Early History of Banking in England" (reviewed in *Journal*, Part I, 1930), which is an invaluable source of information on the origin and development of the cheque and the bank-note and on the early days of the Bank of England. It awakens considerable amazement to find that Mr. Feavearyear does not even include this book in his Bibliography. Once more a French war brought need of money to the Crown, and to fill the empty purse the Bank of England was founded in 1694. Its business, apart from the initial loan to the State, was almost entirely in buying up "tallies" issued in anticipation of revenue, which it did with its "sealed notes" and "notes for running cash"; over a million and three-quarters worth of tallies were held towards the end of 1696. This inflation led to an outbreak of gambling in stocks and guineas rose to 30*s.* Meanwhile the metallic currency had fallen into a desperate state. There had been no recoinage of silver since 1601 and there were no good coins in circulation. Now arose the great controversy between Lowndes, the Secretary to the Treasury, and Locke. Lowndes proposed that as the market price of silver was 6*s.* 5*d.* an ounce and the Mint price 5*s.* 2*d.*, the coins in circulation should be called up 25 per cent. Locke, basing himself on the sanctity of contract, held that the only true pound was 3 oz. 17 dwt. 10 gr. of sterling silver, and that all money should be recoined at this rate. Locke won, but the recall of the light money (which was accepted for taxes up to a certain date) caused great unrest, and in the end the plan in our author's opinion "gave the rich full compensation and the poor very little."

The great development of trade with the Far East led to an immense absorption of silver by those countries, gold flowed into England and fell slightly in relation to silver, gold also was more important than before in internal trade, since transactions were larger. Automatically England came on to the gold standard and in 1717 the value of the guinea was fixed at 21*s.* Silver remained steady in relation to gold for about a century.

The romance of the pound is great; it attaches also to "sterling" which, Mr. Feavearyear informs us, is not connected with the Easterlings but either with the "star" or with the "staer" (starling) with which signs some of the early coins were stamped: It has led us to dwell on the early history alone, but the later is no less thrilling. One need only mention the words—Napoleonic Wars, paper inflation, Bank Restriction, the Bullion Committee, the Bank Charter Act—to bring vividly to the mind violent controversies whose ashes still glow. These matters are all competently treated by Mr. Feavearyear. His last chapter of thirty-five pages contains a swift account of affairs from 1914 to 1928. Wisely he confines himself to telling a straightforward tale with the minimum of suggested criticism on topics for which we have scarcely yet the material for sound judgment. He is fortunate in not having to deal with the most recent aspects of the monetary problem

If it is a test of a book on currency that a reader has read on and on, more unwilling to lay it down than if it had been an "Edgar Wallace," then Mr. Feavearyear's work is of high merit. Such a place in estimation may readily be accorded to it. It *is* a good book, and this reviewer has found that, in the hackneyed phrase, it "fills a felt want."

H. W. M.

10.—*The Gold Standard and Its Future.* By T. E. Gregory, D.Sc., Professor of Currency and Banking in the University of London. 7¾″ × 5″. ix + 115 pp. London: Methuen & Co., 1932. 3*s.* 6*d.* net.

Professor Gregory, after discussing the international gold standard as a factor in international equilibrium, sums up that "the international gold standard supplies the world with a mechanism for maintaining fixity of exchange and for keeping in organic touch with one another the price and income structures of the various countries." It is alleged that the gold standard by bringing about a gold shortage and a maldistribution of gold has caused the present depression. Professor Gregory denies the gold shortage, and holds that "the depression has released forces, *e.g.* renewed uncertainty as to the future position of various currency systems, which have *produced* gold drains." The view is that in 1929 "the heavy flows of gold to New York and to Paris led to an orgy of bank-rate changes in Europe, and these changes, by causing dear money, *produced* the depression. But this view is only tenable on the assumption that the seeds of the depression had not already been sown in the shape of the American boom. At most the bank-rate changes of 1929 brought about the collapse somewhat sooner than would otherwise have been the case by preventing a further outflow of funds to the New York Money Market. The peak of industrial production had already been passed in America, and the decline of production marked the beginning of the end of prosperity. The gold flows of 1929 were doubtless a factor of some importance in the general situation, but they were only one among several: of which the business situation in the United States outranged all others in significance."

The post-war economic structure of the world "has been subjected to an unprecedented degree of political influence." There has been greater nervousness about inflation; "the world economic structure has become rigid to an unprecedented degree" through insurance and price stabilization schemes; and tariffs have increased the difficulties of adjustment. "It is also probably the case that the Central Banks have not sufficiently considered the dangers involved in the devices of which so much has been heard during the recent decade: *i.e.* 'offsetting' and 'sterilizing.'" Finally, economy in the case of gold has been impeded by the legislation regarding the reserve ratios of Central Banks and "by the existence of an abnormally large International Short-Loan Fund."

The events preceding the breakdown of the gold standard are then discussed. "What finally dragged Great Britain off gold was thus an international banking panic, induced partly by the Continental situation, partly by the domestic situation in this country, and partly by the fear that the Continental situation was reacting dangerously on the safety of the London banks." Professor Gregory perhaps hints at some criticism of the Bank of England by asking—and not answering—some rhetorical questions as to whether the collapse could have been prevented by making a larger increase in the fiduciary circulation, by letting gold stocks go, and by raising the Bank rate "up to the traditional figure of 10 per cent."

By going off the gold standard imports have been made dearer and exports cheaper. The export bonus will only continue if the cost of living does not rise, and apparently Professor Gregory thinks it will not rise materially. He infers that "sterling is at present (end of October, 1931) undervalued. . . . Unless there is a further disastrous fall in gold prices or a very sharp rise in sterling prices, a rate of exchange higher than the present one (£1 = $3·80–$3·90) would seem to be justified. But this inference is subject to one assumption of fundamental importance, viz. that monetary policy will be directed towards preventing a general rise in the general level of prices and money incomes."

Three courses for the future are then discussed: "an absolutely independent paper standard"; "a paper currency union," either for the British Empire or including other countries; and a return to the gold standard. With regard to the first, "so long as two great financial markets remain upon gold, the existence of a paper standard in this country imperils the existence of the London money market." A paper currency union would be wrecked on questions of management; even the Dominions have not the same monetary interests. As to the third, Professor Gregory does not think that Great Britain can put much pressure on gold countries. Reparations must be settled, minimum statutory reserve ratios of Central Banks should be abolished, and the gold countries should undertake to lower the gold content of their unit of account. Technical monetary conditions in France and the United States must ultimately cause a rise in the price level. We should, therefore, wait before going back to gold and then fix a rate not too far below the original level. "Given that world prices will rise, there is no justification for the very low rate of exchange being put forward in current newspaper discussion of the possibilities of devaluation."

Seldom has so much matter, or matter so explosive, been packed into so small a compass. There are a bare hundred pages of text, the rest of the book being taken up with some useful statistical tables. H. W. M.

11.—*The Gold Standard in Theory and Practice.* By R. G. Hawtrey. 2nd Edition. 7¾" + 5". 168 pp. London: Longmans, 1931. 3*s.* 6*d.* net.

Trade Depression and the Way Out. By R. G. Hawtrey. 8½" × 5½". viii + 84 pp. London: Longmans, 1931. 2*s.* 6*d.* net.

The first of these books is the second edition of a book of four lectures delivered for the Institute of Bankers in 1926. The first two expound the theory and are an admirably clear introduction to the study of monetary problems. The third lecture is historical, again an excellent summary. The fourth is devoted to an account of the problems of the day, with the general conclusion that "if the gold standard countries all agree to keep the purchasing power of their currencies stable, these sudden discrepancies which cause exports of gold to those countries whose currencies appreciate will not occur." In the fifth chapter, added in this edition, Mr. Hawtrey confesses that "in the interval of five years that has since elapsed the gold standard as an international institution has been a disastrous failure." He is uncertain "whether the restoration of the old gold parity did or did not make costs excessive in relation to world prices," but has no doubt as to the evils of the high Bank rate in 1925–7 at a time when America was pursuing a policy of credit relaxation. Then came the Wall Street boom with the consequent drain of gold from Europe, which was ultimately checked only by the raising of its rate by the Bank of England. But the principal cause of the loss of gold by the Bank was the drain to France resulting from the restrictive French banking laws. Ultimately we were forced off the gold standard, and Mr. Hawtrey's pages thereon are worth careful study. "Eventually, if the depreciation of the currency is great enough, the industries of the country will be normally remunerative and fully employed. . . . But the essential advantage of abandoning the gold standard is that the value of the currency can be adjusted to the point at which *prices and costs are in equilibrium.* Here is the key to the unemployment problem." "I think we should absolutely refuse to return to gold till there is some adequate safeguard against fluctuations in the purchasing power of gold." This requires international co-operation, but probably an agreement on policy with the United States would suffice.

In the pamphlet on *Trade Depression and the Way Out* Mr. Hawtrey provides an abundance of contentious matter. The most characteristic symptom of a trade depression is shortage of demand; the incomes of producers have to be provided before the product is available for sale, and "a prerequisite condition of increased production is likely, therefore, to be increased lending by the banks." The rise in prices which follows requires further creations of credit up to the degree possible under the limitations usually imposed on central banks in their management of currency. "If we call the price levels of home trade products and foreign trade products the internal price level and the external price level respectively, we may say that the gold standard requires a country to adapt its incomes to its external price level and its internal price level to its incomes. . . . Everything which affects the balance of payments of a country requires a corresponding adjustment of its incomes and of its internal price level, and its banking system is responsible for effecting the adjustment. Failure to do so results in an outflow or inflow of gold."

But we cannot pursue further the close-packed argument, without doing it wrong. Probably those who object most to it will profit most from it—owing to the necessity of having to marshal their own arguments to meet point by point. The "way out" is simple—"the *only* real remedy is the expansion of credit by the central banks." The other banks are in this way to be "flooded with idle money" for which they must find employment by lending.

H. W. M.

12.—*Prosperity:* Myth and Reality in American Economic Life. By M. J. Bonn. 8¾" × 5¾". 188 pp. London: Martin Hopkinson, Ltd., 1931. *7s. 6d.* net.

The great collapse of the American economic structure which we have witnessed in process during the last two years has shaken even the Americans themselves out of their complacent belief that prosperity was their inexpugnable heritage. The existence of that belief and the policy which it engendered were economic facts of the first magnitude which affected the whole world. It is, therefore, imperative that we should understand the psychological basis of the economy of the United States before we can estimate the value of the statistical data which form the record of the material happenings during the boom and the slump. This Professor Bonn has done for us, showing the working of the energetic, sometimes lawless, pioneer spirit in a new land and especially in the new circumstances after the World War. "Three causes," he says, "—natural resources, revolutionary temperament, and deliberate technical aspiration—have shaped the economic and social life of the United States of the past." The war precipitated changes which might have taken a quarter of a century to produce in peace-time—the rise in wages which created "a far-reaching increase in the power of the working-classes," the cessation of "the development policy based on free land," "the mechanization of domestic life" as a substitute for domestic service, the "straining after an increase of consumption at a more and more feverish rate," the standardization of the needs of the middle classes, the systematic development of the instalment system. The industrial boom was an expansion of the consumption industries, and the fanatical belief in an ever-continuing increase of capital values led to an insane development of speculation.

But there were many weak spots in industry, especially in the older industries—railways, coal, oil, cotton, agriculture—and when the Wall Street bubble was pricked by the raising of the Bank of England rate the crisis spread to industry and grew at a precipitous speed. The extreme individualism of American industry is still rooted in the concept of the small business man, who still in a world of Trusts dreams of becoming a hero like Ford and elevates the great industrial leaders to the foremost rank in the Republic. The crashing of these economic supermen who were no longer able to produce prosperity to order has had profound effects. "Now they were forced to recognize that they had not been the deity controlling the winds and the tides, but rather the cork borne along helplessly on the crest of the wave. Such a recognition is bitter. But it is wholesome for the future." Professor Bonn optimistically thinks it will have a salutary effect on the relations of the United States to Europe. "For the arrogance with which successful American economic demigods have contemplated the difficulties of European economic mortals has begun to give place to a sympathetic understanding, since they have realized that again and again it is the forces of the past, and not the will of the individual in the present, that determine success or failure." In any case if the captains of industry cannot furbish up their old magic and make the United States a middle-class paradise again, the great masses may turn to the new magic of the "Five Years' Plan." The abandonment of American parochialism in economics and politics is a necessary precedent to domestic prosperity—that is the next lesson the United States have to learn.

This is an excellent book, lucid, fair, and interesting. The translation has the great merit of not reading like a translation.

H. W. M.

13.—*The Federal Trust Policy.* By John D. Clark, Professor of Economics, University of Denver. 8½″ × 5¾″. 305 pp. Baltimore, The Johns Hopkins Press; London: Oxford University Press. 1931. $2·75.

Rather more than fifty years ago Henry Demarest Lloyd made a sensational disclosure of the relations between the railroads and the Standard Oil Company, but it was not till 1890 that Senator Sherman secured the passing of the Act generally known by his name, the object of which was to declare illegal all combinations acting in restraint of trade or to prevent competition. Professor Clark sets out to expound this law and to recount its chequered career of neglect, re-interpretation, and enforcement during the past forty years. "The Sherman Act," he says, "was not forced from Congress by an hysterical public, nor was it the work of a body of excited representatives of the people; the public was not hysterical and the members of Congress were so little excited that few of them cared to take an active part in the legislative process. It was the result of calm consideration by a few congressional leaders, and their colleagues were willing to follow them and to expedite the passage of the law because the situation obviously required federal intervention" (pp. 36–7). Throughout the debates of 1888–90 and 1899–1900 the legislators "acted upon a theory of non-intervention by the state in the management of private business coupled with the theory of state-enforced competitive conditions, if not of enforced competition itself" (p. 78). "Apparently," says Professor Clark, "Congress did not realize that in prohibiting monopolizing combinations it was flouting an almost unanimous economic opinion that to prevent combination was not only impossible, but if possible would be harmful to the public interest" (p. 88). He does not think much of the "professional economists" and devotes a whole chapter to the exposition of their views, with which, like another Athanasius, he deals doughtily—but whether effectively is another question. After quoting President Hoover to the effect that "Competition is not only the basis of protection to the consumer but it is the incentive to progress," his final conclusion is:—"The Sherman Act has withstood every challenge for forty years, not only because it is an example of that perfect legislation which adopts a policy midway between the extremes of public opinion; it lives because it exemplifies the American theory of individualism" (p. 298). H. W. M.

14.—*The Cotton Trade and Industrial Lancashire*, 1600–1780. By Alfred P. Wadsworth and Julia de Lacy Mann, Principal of St. Hilda's College, Oxford. 8¾″ × 6″. xii + 539 pp. Manchester University Press. 1931. 25*s*. net.

Some books, from their very merits, defy review, and this book is one of them. It is a massive contribution to the history of the cotton trade during a period which has received too little attention, and all who are interested in the study of origins will find it fascinating. Such an adjective applied to a sober and detailed work of industrial history may appear extravagant to some, but romance brought up the nine-fifteen!

The work is a composite one, divided into five parts, Mr. Wadsworth being responsible for the first, third, and fourth, and Miss Mann for the second and fifth. There are also seven appendices, including two on imports and re-exports of raw cotton, 1698–1780, and cotton prices, 1607–1780, and six maps and charts are interspersed in the text. In their preface the authors say that they "began their researches independently—one from the angle of the organization and social background of the Lancashire textile industries; the other from that of the growth of the cotton trade in England and on the Continent. This initial difference of approach has left its mark on the form of the book, and has resulted in a lack of unity which, they are conscious, is greater than could be explained by the inevitable disharmony of dual ownership." This apology is entirely unneeded; the present reader has perceived no disharmony and the repetition of approach to a problem from two points of view has been, to him, helpful and not at all superfluous.

The following convenient summary of the contents of the book is taken from the preface: "Book I describes the emergence of a country textile industry in Lancashire in the sixteenth and seventeenth centuries, the parallel growth of manufactures of wool, linen, and cotton, and their industrial organization. Book II attempts to outline the place of cotton goods in the European commerce of the eighteenth century, and sketches the development of the English cotton industry from 1700 to the successful adoption of spinning machinery, with a glance at the parallel course of events in France. Book III describes the forms of capitalist organization in Lancashire into which the industry was cast. Book IV deals with some aspects of working-class life on the eve of the factory system. Book V discusses the earlier mechanical inventions in spinning and weaving, and their part in creating the factory system." The cotton industry began as an adjunct to the wool and linen trades, originating in this country in the production of mixed cloths. In its early stages it partook of the common forms of domestic industry with which every student is familiar. Gradually the various partners in manufacture and distribution segregated themselves and at the end of their story the authors leave us on the verge of the modern factory system. Reality is given to the development by repeated reference to the actual dealings of the individual men who built up the industry. It is invidious to particularize, but no injustice is done to the other excellent parts of a first-rate book if mention is made of Chapter VIII on the Export Trade in Cotton Goods (with special reference to the slave trade as a factor), to Chapter XV on the Transition to Industrial Capitalism, and to Book IV on Lancashire Wage-earners before the Factory System. H. W. M.

15.—*Tariffs: the Case Examined.* By a Committee of Economists under the Chairmanship of Sir William Beveridge, K.C.B. 7½" × 4¾". xi + 301 pp. London: Longmans. 1931. 7*s.* 6*d*

The subject-matter of this book is of too controversial a nature for it to be desirable to review the volume at length in the Society's *Journal*. It is addressed to the general reader, and in it the case for tariffs is dealt with by a committee of economists who write from the Free Trade point of view. Nine economists have shared in the production of the book, including Sir William Beveridge, Professors Bowley, Gregory, Plant, and Robbins, and Sir Walter Layton. Most of the writing was the work of Sir William Beveridge, but chapters on certain portions of the subject have been contributed by other members of the Committee. It goes without saying that the book is written with great vigour and it is remarkable for the freshness and interest with which an ever-present controversy has been invested. The Free Trade point of view is put forward in all its vigour and with great ability, but not with any unfair pressing of the case against what are held to be flaws in the arguments for tariffs. Two of the most interesting chapters of the book are those on "Protection and Unemployment" and "Dumping," together with an appendix which explains and criticizes the Anti-Dumping Regulations of the South African Tariff. This Appendix is most informative. Within the limits allowed by 300 pages it is difficult to imagine a more complete exposition of the controversy, and the book is one which can be disregarded neither by those who support nor by those who disagree with protective duties. W. A. B.

16.—*Capital in Sterling.* By A. P. L. Gordon; with a foreword by Sir Josiah Stamp, G.B.E. 7¼″ × 5″. x + 118 pp. London: H. Hartley, 1931. 5*s.*

The Crisis of 1931. By D. T. Jack, M.A. 7¼″ × 4¾″. 60 pp. London: P. S. King, 1931. 2*s.*

The Key to Prosperity: Abundance: Leisure: Contentment. By G. A. Cram. 8¼″ × 5½″ 63 pp. London: Pitman, 1931. 2*s.* 6*d.*

World Depression and World Prosperity. By A. G. McGregor. 7¼″ × 5″. ix + 118 pp. London: P. S. King, 1931. 5*s.*

The Gold Tangle and the Way Out. By Frederick and Alfred Wigglesworth. 7¼″ × 5″. London: John Lane, 1931. 5*s.*

Some Lessons of the World Depression. By Johan Åkerman, Ph.D. 10″ × 7⅛″. 43 pp. Stockholm: Nordisha Bokhandeln, 1931.

The first two of these books are mainly straightforward accounts of the sterling crisis and the events which led to it. Their authors are concerned to make the facts clear rather than to express views or to advocate policies. The authors of the next three, all business men, are, on the contrary, essentially propagandists. Their books are addressed to the ordinary man, who may be puzzled to learn that while the way to World Prosperity lies in the permanent abandonment of the gold standard, Mr. Cram "doubts if there is any need to introduce the question of the gold standard into an examination of the causes of the crisis," and that the Key to Prosperity consists, roughly stated, in the adoption of tariffs and of a five-day working week. As the prescription indicates, the basic cause of the crisis is diagnosed as over-production, and the fall in prices is attributed almost entirely to this. Mr. Cram writes crisply and concisely, and although he would appear to have put his blind eye to the telescope when observing monetary phenomena, he makes a number of shrewd observations with respect to other factors in the situation.

Mr. McGregor, in his introduction, states that he lays no claim to be an economist, but nevertheless sets out his views on the fallacies in what he terms "international dealing" and the present monetary system, and proceeds to elaborate new methods which he maintains would prove a solution for current world problems. The failure of the present monetary system he attributes to the necessity of using for international payments domestic currencies tied to gold. He advocates the adoption of a new monetary system (somewhat paradoxically labelled the Golden Rule) in which domestic currency in the first place should be freed from gold and should be regulated by rediscount rates, so that its purchasing power should remain constant and should correspond in exchange value with the average value of all principal basic commodities. For the purpose of international payments an exchange rate for domestic currency with gold should be determined, and it is suggested that international payments should be made through an International Clearing House Committee. It is argued that in effect creditor nations would then themselves have to bear the burden of financing "over-selling" and this tendency would have to be corrected by taxation or other internal financing until an international trade equilibrium was regained. The author, though principally concerned with the problems of the United States of America, ends by elaborating his ideas as to the particular present-day difficulties of different nations, and lays stress on the disastrous effect of high tariff walls and the burden of war debts.

The authors of the *Gold Tangle* would also relate the supply of sterling currency to the movements of a price index of basic commodities ("an isometric currency"); the Bank's cover would consist of fixed-interest-bearing securities; international balances would be settled by the conversion of the currency unit "into any or all of the products for which it stands by simply applying at the various wholesale markets." The procedure does not seem to be more precisely explained, and the book shows other signs of haste, while the obvious sincerity and enthusiasm of the authors manifest themselves in a kind of special pleading which is apt to be less convincing than comparatively bare statements. A large part of the space, too, is taken up by a rather sketchy exposition of the principles of economics and finance, which can hardly be assimilated at a gulp as a preliminary to the understanding of the author's contentions.

Perhaps the most effective comment on the several panaceas is implicit in their diversity. The authors might broaden their views by reading one another's books. They might then turn to those of Mr. Gordon and Mr. Jack. Mr. Gordon, whose book, we gather, was issued very soon after the departure from gold, narrates the chief occurrences in precise and vivid language with just so much explanation by the way as will make the facts plain; the page or so on the working of the foreign exchanges (pp. 4–5) is an example of his skilful use of words to convey a large amount of real information in a brief space. The book is in three parts: I. Sterling and the Crisis, II. the Non-Sterling Pound (in which the transient and the permanent benefits of devaluation to British industry are discussed), III. Capital and Investments. This last portion includes some provisional forecasts, but no specific is offered. The author's contribution in that kind is, as Sir Josiah Stamp says in his foreword, his "proper emphasis of facts." Five charts (drawn by Mr. G. H. M. Farley) illustrate the movements of industrial shares, commodity prices, pound and dollar prices, and price movements of British Funds.

Mr. Jack's brochure is a careful record of the financial events of 1931, beginning with the difficulties of the Austrian Credit Anstalt in May. The facts are given with a good many detailed figures and the book is evidently not intended for the uninstructed. The last section discusses soberly and impartially, as becomes a lecturer on political economy, the possibility of various lines of policy which might be adopted. D. C. T. E.

A multitude of books has been written on this topic and multitudes more will come. Dr. Åkerman, however, has taken a somewhat new point of attack. "In dealing with crises in general, in so far," he says, "as the use of catch phrases is defensible for explaining complicated causal connections, it may be stated with good reason that *over-capitalization* is the primary cause of the crisis. As the conjunctural curve rises, the ever-expanding bubble of values applied to means of production finally bursts; over-capitalization is thus purely a consequence of an altered relation between the value of goods for immediate consumption and that of goods for future consumption." After an analysis of cycles he concludes that "a true policy of adjustment will only be possible when it is realized that business cycles are primarily based on capitalization and that there exists a connection between business cycles and economic progress." Half a dozen pages on the "causal connections of the depression" are admirable. Remedies for a depression like the present are to be found in low discount rates, cutting of losses by business concerns, a wage-level moving with the business situation, restriction of domestic expenditure to necessaries, lowering of tariff barriers. The lesson from our recent experience is that "what is needed is nothing more nor less than an agreement between the principal central banks as to the right moment for putting an end to an international boom."
M.

17.—*Unemployment Problems in* 1931. Studies prepared by the International Labour Office. 9½″ × 6¼″. 289 pp. Geneva, 1931. London: P. S. King. 6*s.*

The volume consists of the Report of the Director to the Fifteenth Session of the International Labour Office so far as it relates to unemployment, together with six memoranda supplementing the Directors' report. The report itself discusses at considerable length the various causes put forward to account for the continued prevalence of excessive unemployment over a number of years and its increased acuteness since the latter part of 1929, *e.g.* currency difficulties, over-production of certain food products and raw materials, the extra-rapid increase in efficiency of equipment, the fall in the price of silver, rationalization in industry, etc. The Director has no doubt that the pace of mechanization during the last few years has brought and will continue to bring unemployment on a large number of workers with no chance of their finding other work for some considerable time.

Necessarily the proposals put forward for remedying unemployment are in the nature of palliatives. Great stress is laid upon national systems of unemployment insurance, the extension of which to countries without a system is looked forward to with what we should think is undue hopefulness. The large extension of agencies for placing workpeople in employment is advocated strongly, the haphazard methods of engagement in most trades being rightly condemned. Perhaps too much stress is put upon the advisability and possibility of extensive provision of public works in times of long-continued depression—the policy, though strongly advocated in some quarters, is violently assailed in others. At any rate, in severe depressions it can relieve but a very small fraction of the unemployed.

In one of the memoranda Prof. Ansiaux of Brussels discusses the effect on unemployment of the disturbances in international trade due to tariffs and other trade barriers. The tendency to cause unemployment is, he contends, inherent in all measures restricting international trade, but he points out that though a large proportion of world unemployment is due to the policy of trade restrictions, that policy is so far from being overthrown that "the very growth of unemployment serves as a pretext for pursuing it more rigorously."

The volume concludes with a memorandum on Wages and Employment by Mr. G. D. H. Cole. He is strongly opposed to any attempt to combat unemployment by the method of reducing wages, and indeed claims that a far better way would be "an international agreement to raise wage-rates and so increase the volume of purchasing power in accordance with the modern expansion of productive capacity." The writer seems to recognize that this way is not possible of attainment, but thinks "it should at least be possible to secure a common agreement among States to countenance no movement designed to bring about a general reduction in wage-rates in any country." The whole discussion and the suggestions are highly interesting but, of course, very much "in the air." W. A. B.

18.—*Combines and Rationalization in Germany*, 1924–1928. By D. Warriner. 8½″ × 5½″. vii + 226 pp. London: P. S. King, 1931. 10*s*. 6*d*.

This book was begun when Miss Warriner held a research studentship at the London School of Economics and was completed during her tenure of a research fellowship at Somerville College, Oxford. It is an able and penetrating study of the combine movement in Germany and of such rationalization of industries as has been effected in that country. The method pursued has not been to take each of the industries concerned and show the various stages by which it has arrived at its present position, but to deal with the different aspects of the combine movement, illustrating the discussion by reference to particular industries. Nevertheless, much information regarding such industries may be gleaned from the book.

In the first chapter the stage is set for the succeeding ones. Attention is called to certain fundamental differences between British and German industries. In Great Britain the chief problem is the relations of capital and labour—in Germany costs of capital and transport are more important considerations. British industry relies more on export markets than is the case with German industry. It is pointed out that, apart from the combination movement, the German heavy industry undertakings are, generally, much larger than the British and that the German marketing syndicates are much older. The post-war combination movement in Germany "differed essentially from the pre-war movement in that it affected every industry. Its rapidity and universality were due to one cause, and one cause only, the financial situation." Amalgamations have not been so frequent in the finishing branches as in the heavy industries because the former have been financially weaker. The average firm in the manufacturing branches is smaller and in some branches "the private undertaking is typical and prevalent as it is not in any branch of the heavy industry." Speaking of the general position in Germany in 1930 it is shown that "Textiles, leather, certain branches of machine construction are certainly depressed, but engineering as a whole, paper and some of the small speciality industries are doing fairly well, while artificial silk and electro-technical products have enjoyed sustained prosperity. If output is to be the test of prosperity, then the heavy industry is prosperous, but if financial results are to be the test, the coal and iron concerns do not make such a brilliant impression."

In a chapter dealing with the extent of market control, estimates are put forward of the gross output of German industries in 1926 (35 milliard Rm.), and of the output controlled by cartel and/or trust (about 21 milliard Rm., or about three-fifths of the gross output). In the case of coal and by-products, iron and steel and iron ore, non-ferrous metals, potash and chemicals, accounting for 11·7 milliard Rm., the whole output was controlled. Of the more important groups of industries, textiles was the weakest as regards organization. The gross output of this group was 5 milliard Rm., of which 2 milliard was controlled. "The industry has never been a strong unit, for in the days of Germany's industrial expansion there were no docile tropical markets of any size, and demand in the home market increased only slowly." Since the war it has not only shared in the misfortunes common to other industries, but some branches of textiles have encountered special difficulties.

Discussing the subject of rationalization, Miss Warriner shows that "the word, in spite of its popularity, is capable of being used with an exact meaning. It connects the processes of works reorganization and scientific management usually associated with the name of Taylor, the processes of standardization and specialization associated with the name of Ford, with the industrial combination movement in both its aspects of financial amalgamation and price control. The novelty consists in the combination of the two ideas—regrouping as a preliminary to reorganization." The genuine combination movement began in the spring of 1926, after the lowering of the discount rate enabling issues to be made in the home market, and the movement was one of "horizontal amalgamation as a means of long-term borrowing. Finance is the one unifying and underlying factor of the whole post-war movement, in which no unity of direction, only unity of origin, is discernible." It appears that it is in the heavy industries that the least progress has been made in true rationalization. Then follows an account of the steps taken since the war (up to 1928) in an endeavour to place those industries on an economic basis and, in particular, the readjustments made in consequence of the effect of the peace treaty on the interchange of products between the Ruhr and Lorraine.

It seems that the only instance of genuine rationalization was the scheme carried out by the Chemical Trust, a fusion of groups of firms which, previously, had been working in co-operation for years. This Trust has "concentrated its management in the hands of a small board, to which the directorate has delegated complete control, and which holds the controlling interest in the company. To this concentration of interest must be attributed the drive, method, and success of its rationalization plans, and the extreme reticence which has surrounded them."

In an interesting discussion on (*a*) the Trust and (*b*) the State as rationalizing agent it is shown that "all the most sensational results have been achieved by Trusts, though the great number of fusions only control a part of the total capital engaged in the industry and can only introduce schemes for partial reorganization benefiting groups of firms, not the entire industry." In certain circumstances the enforcement of a cartel by the State seems to be appropriate in Germany, *i.e.* where an industry suffers from over-production and reorganization would restore it to a profit-earning basis.

In a chapter dealing with the achievement of combines in Germany there is, *inter alia*, an account of the problem of the reduction of transport costs in the heavy industries and, more particularly, the mining branch. The Ruhr mines, in an endeavour to widen their market, have adopted a scheme of long-distance transmission of gas from their collieries to Rheinland-Westphalia, to be extended later to the whole empire. This costly and ambitious scheme has aroused much opposition, chiefly from the gasworks and railway interests.

Turning to the effect of the combination movement on general industrial conditions, the author shows that "the rationalization and combination movements have certainly done nothing to produce the three conditions on which alone, according to Dr. Moritz Bonn, capitalism is tolerable—high wages, low prices, and widely diffused stock ownership, which German capitalism, as compared with the British and American varieties, is farthest from fulfilling. Combination even appears to have intensified the natural tendency of German capitalism to work in the opposite direction."

In Germany the expansion of the newer industries, such as synthetic nitrates, artificial silk, low-temperature carbonization of coal, has been financed by the coal and chemical industries, and this method "presents a marked contrast with their development in Great Britain; here the new industries, with the exception of nitrates, were financed by speculative issues in the market," while in France the development has been on lines similar to those followed in Germany. In Great Britain "the mere fact of amalgamation has not enabled the Chemical Trust to take the initiative; on the contrary, the I.C.I. has pursued the old policy of acquiring unconnected established firms in a weak financial position, a tendency which German industry has now overcome. The French and German method undoubtedly promises a sounder development of the new industries of the type which requires long periods of gestation and commercial experiment, large units of production, immense capital reserves, and accumulated technical experience." When writing this Miss Warriner seems to have overlooked the Imperial Chemical Industries' great new enterprise at Billingham.

A chapter is devoted to the consideration of the Cartel Decree of 1923 and its working. The idea of such legislation did not attract much popular support until, in November, 1923, "inflation had proceeded beyond the stage of benefit to certain producers to the stage of disaster to all consumers." The vital clause remodelled and extended a clause of the Civil Code giving to "parties to certain contracts a right of recission under certain circumstances." Most of the cases that are brought to court come under this clause and under the succeeding clause, which deals with the infliction of disciplinary measures. Of cases brought to court 70 per cent. are settled in the course of preliminary arbitration proceedings. Although the results of such proceedings are not published, it is generally agreed that "the arbitrator is extremely careful of the cartel's interests and not inclined to leniency to the rescinding member."

In her last chapter Miss Warriner discusses various theories regarding combines which have been propounded by German economists, and concludes as follows:—"The refinements of economic theory do not concern State policy; it only needs to find some rough but generally accepted test of what constitutes injurious action. But such a test is not available so long as there is no generally recognized method of approach in economic theory, and therefore no doctrine of what is desirable. It is not merely that absence of information stands in the way; even if the combines conducted their activities in the light of complete publicity, still it would be impossible for the State to systematize its interventions. It is not that capitalism has outrun democracy, but that democracy has no means of deciding what capitalism involves." This conclusion, while interesting in itself, affords some evidence of the balanced judgment which Miss Warriner has brought to bear, throughout, on her investigations.

In an appendix there are useful statistics relating to the heavy industries of Germany. J. W. V.

19.—*Economic Essays and Addresses.* By A. C. Pigou, M.A., Professor of Political Economy in the University of Cambridge, and Dennis H. Robertson, M.A., Reader in Economics in the University of Cambridge. $8\frac{7}{8}'' \times 5\frac{5}{8}''$. vii + 215 pp. London: P. S. King & Son, Ltd., 1931. 10*s.* 6*d.* net.

Professor Pigou leads off with the Sidney Ball lecture of 1929 on "the function of economic analysis." "Any effort," he says, "that seeks to explain events, to trace the sequence of causes and effects, to discover laws of wider or of narrower application, in short to dig below the surface of a field for the roots of plants that grow there, is for me analysis," and he achieves a brilliant defence of the use of statistical studies. "Limiting Factors in Wage Rates" delivered to a Copartnership Congress in 1926 suggests that the living-wage doctrine is dangerous and should be replaced by the demand that whatever wage a man was receiving he should be assured, "through the expenditure of public funds if need be, a minimum of *living conditions*." The third chapter discusses the power of associations of producers to secure stabilization in particular industries. Next follow three mathematical chapters on "Disturbances of Equilibrium in International Trade," "The Statistical Derivation of Demand Curves," and "Demand and Supply Equation." On these the present reviewer would only remark that he is humble enough to believe with Marshall that "it seems doubtful whether anyone spends his time well in reading lengthy translations of economic doctrines into mathematics that have not been done by himself."

Perhaps Mr. Robertson's most important contribution is a lecture on "Theories of Banking Policy," which would be useful were it only for the reminder that when Governor Strong sought to raise commodity prices by pumping money into circulation he found that it only found its way to Wall Street. The chief surprise of his memorandum on "The World Slump" presented to the Macmillan Committee is his delightful audacity in quoting Drayton's famous sonnet in a very academic discourse to that august body. Notable are his theoretical defence of the valorization of raw commodities, his doubt whether "an uneconomically high real wage-level is a *practically* important cause of unemployment in this country to-day," and his question, "Is there really evidence that 'the English price-level' is 10 per cent. out of equilibrium with 'the world price-level'?" A review of "the monetary doctrines of Messrs. Foster and Catchings," reprinted from the *Quarterly Journal of Economics*, will interest students of their works. From his fourth chapter, "Notes on International Trade," which deals with "the terms of trade" and "the transfer problem," we must lift his description of Mr. Keynes as "a raven not easily to be baulked of his croak." The last chapter reproduces the talks on "World Finance" given for the B.B.C. in January and February, 1931, an admirable elementary introduction. H. W. M.

20.—*Other New Publications.**

Favre (Adrien). Les origines du système métrique. 9″ × 5½″. 242 pp. Paris: Presses Universitaires de France, 1931. 15 *fr.*

[Before the introduction, in 1795, of the metric system, the weights and measures of France were in greater confusion than those of any other country. They varied not only from province to province but from town to town, and even within certain towns, and the resulting complication was such as to impede all business. Thus, although the original conception of the system was not of French origin, the strongest impulse towards a solution of the problem arose in France. For several centuries attempts had been made at intervals to establish some uniformity, and M. Favre's book traces the history in detail. It is divided into four parts: I. the administrative problem, which includes a description of the more important of the old French weights and measures; II. the scientific problem, with an account of the attempts to discover the desired "natural and universal unit"; III. the first solution, which begins with the story of a Franco-English project (1790); IV. the final solution. Two appendices give, respectively, the correspondence with the English government on the subject, and a comparison of the Abbé Mouton's nomenclature with that of the metric system; the third discusses the "philosophers" in relation to national pride in the eighteenth century. Finally, we are given a comprehensive bibliography.]

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* *See also* "Additions to Library," p. 378.

Hantos (*Elemér*). L'Économie Mondiale et la Société des Nations. 9″ × 5¾″. 384 pp. Paris: Marcel Giard, 1930. 50 *fr.*

[An elaborate study of the present economic conditions of the world in relation to the League of Nations and its work for social peace and towards greater international economic solidarity. It includes a review of the League's activities prior to the International Economic Conference of 1927 and an account of the conference itself and of the problems, commercial, industrial, and agricultural, with which it dealt. The latter part of the book deals with the work of the League since the conference, especially its efforts for the reduction of tariffs and other hindrances to freedom of trade. An interesting chapter somewhat on the lines of a *catalogue raisonné* is devoted to the documentation of the League's activities, and there is an index of the authors cited in the book.]

Mortara (*Giorgio*). Prospettive Economiche. 11a edizione. 10″ × 7″. xxii + 500 pp. Milan: Università Bocconi, 1931. 50 *lire*

[Professor Mortara's valuable compilation has been noticed repeatedly in the *Journal*. The present edition is on much the same lines as earlier issues and offers little opportunity for fresh remark. It opens with the usual introductory survey, which is followed by statistical summaries of the world production and distribution of some twelve commodities of major importance to Italy, with descriptions of their market conditions, and forecasts of their production and prices for the year. There are also chapters dealing with hydraulic power, sea and land transport, and currency and finance, in relation not only to Italy but to the rest of the world. In addition to the usual detailed table of contents, there is an index.]

Peddie (*J. Taylor*). The Crisis of the £. 8½″ × 5¼″. xii + 138 pp. London: Macmillan, 1932. 7*s.* 6*d.*

[This book has been written as a supplement to the author's *Dual System of Stabilization*. He advocates a Central Reserve System based on self-liquidating commodity bills. He would separate the "commercial" system of banking from the "financial," and require the former to be financed exclusively by bills. He makes certain consequential proposals regarding the debt, the tariff, etc.]

Rogin (*Leo*). The Introduction of Farm Machinery in its relation to the Productivity of Labor in the Agriculture of the United States during the Nineteenth Century. (University of California Publications in Economics, Vol. 9.) 10½″ × 7¼″. ix + 260 pp. Berkeley, California: University of California Press, 1931. $3·50.

[An economic and historical study of the influence on production and on labour of the introduction of machinery into American agriculture.

The enquiry deals only with wheat, although it was originally intended to embrace also maize, cotton, and hay. It is in two sections, the first relating to the plough in its various forms and to other tillage implements. These are described in detail with their gradual improvement, and the results of their adoption are discussed. The second section consists of an investigation of wheat production and includes a description of harvesting, threshing, and seeding machines in relation to their efficiency and output and the resultant changes in the amount of human labour required. A bibliography and index are given.]

Sirkin (D.). A Plain Guide to the Financial Situation. 7¼″ 4½″. 56 pp. London: P. S. King, 1932. *2s. 6d.*

[A clearly written unpretending little book intended to explain in a simple way, first, the monetary system and the problems connected with reparations, international debts, tariffs, and so forth, then the development of the crisis and the effects of suspension. The author does not force his opinions on his readers but allows them to see that he is against tariffs and thinks it impracticable to return to the gold standard.]

CURRENT NOTES.

On another page we give our usual table summarizing the overseas trade of the United Kingdom for the years ended March 31st, 1931 and 1932. The value of the total imports during the first quarter of this year amounted to £193,416,000, a decrease of 7·8 per cent. on the corresponding figure for last year. British exports were valued at £92,331,000, showing a decrease of 10·7 per cent., while exports of imported merchandise were valued at £16,115,000, a decline of 7·0 per cent. There has thus been a considerable all-round decrease in value as compared with a year ago. The following figures, recently published in the *Board of Trade Journal*, show the effect of eliminating price changes, the trade during the two quarters being revalued at the average values of the whole year 1930:—

	January–March		Change in Volume.
	1932.	1931.	
	£ mill.	£ mill.	Per cent.
Imports	248·0	248·4	— 0·2
Re-exports	21·9	20·7	+ 5·9
Retained imports	226·1	227·7	— 0·8
Domestic exports	109·4	110·9	— 1·3

The above figures show how remarkably little change there has been in the total volume of goods imported and exported when last quarter is compared with a year earlier. There have, however, been some significant changes in the make-up of the totals. Retained imports of food, drink, and tobacco were 5·4 per cent. greater in quantity than in the first quarter of 1931, and retained imports of raw materials increased by 14·5 per cent., while there was a decrease of 22·7 per cent. in the quantity of manufactured articles retained. In regard to British exports, on the other hand, there were decreases in the quantities of food, drink, and tobacco and of raw materials exported, but an increase of 1·0 per cent. in the exports of manufactured articles. The exports of manufactured articles last quarter were, in fact, greater in quantity than in any quarter of last year. As the exports during the first quarter of the year are normally less than those in the fourth quarter of the preceding year, and as, moreover, the first quarter of this year contained the Easter holidays, with the consequent disturbance of trade, the figures appear to indicate an appreciable revival in the export trade in manufactured articles. The export trade in raw materials, consisting essentially of coal, failed to show a similar expansion, due no doubt in large part to the quota restrictions and exchange difficulties in some of our most important markets.

On the import side, the increase in the volume of raw materials imported is a further hopeful sign, though it should be noted that the retained imports of raw materials last quarter were some 4 per cent. less than in the first quarter of 1930. In the fourth quarter of 1931, raw materials imported were nearly 7 per cent. more than in the fourth quarter of 1930. Retained imports of food, drink, and tobacco showed for each quarter last year an increase in quantity over the corresponding quarter of 1930 and, as indicated above, a further increase was recorded last quarter, when the quantity retained was nearly 11 per cent. more than two years ago. The decline in the imports of manufactured articles may be traced in main part to the Orders made under the Abnormal Importations (Customs Duties) Act. The President of the Board of Trade stated in the House of Commons that these orders had caused a direct reduction of imports by more than £8,000,000 during the past quarter. It is, perhaps, too early yet for the figures to show any reduction due to the general 10 per cent. duty which became operative on March 1st on the bulk of goods not already dutiable. The exemptions contained in the Schedule to the Import Duties Act related to about 43 per cent. of the retained imports of food, drink, and tobacco, 62 per cent. for raw materials, and 6 per cent. for manufactured articles, or, taking all classes of goods together, to about 36 per cent. During February there was a considerable amount of forestalling of the 10 per cent. duty, imports of manufactured articles in that month being valued at £20,149,000 as compared with £13,305,000 in January and £13,031,000 in March. The March total may, of course, have been affected by the Easter holidays as well as by the rush at the end of February to record goods immediately on importation instead of at some later time during the period allowed for registration.

Movements and Classes.	Twelve Months ended March, 1931	Twelve Months ended March, 1932	Increase (+) or Decrease (−).
Imports, c.i.f.—	£'000.	£'000.	£'000.
Food, drink, and tobacco	453,646	414,109	− 39,537
Raw materials and articles mainly unmanufactured	218,400	175,998	− 42,402
Articles wholly or mainly manufactured ...	287,827	246,196	− 41,631
Other articles	10,399	9,487	− 912
Total Imports ...	970,272	845,790	−124,482
Exports, f.o b.—			
United Kingdom Produce and Manufactures—			
Food, drink, and tobacco	45,382	34,307	− 11,075
Raw materials and articles mainly unmanufactured	56,750	46,071	− 10,679
Articles wholly or mainly manufactured ...	390,090	282,375	−107,715
Other articles	17,747	5,396	− 2,351
Imported Merchandise—			
Food, drink, and tobacco	23,120	19,736	− 3,384
Raw materials and articles mainly unmanufactured	34,194	25,686	− 8,508
Articles wholly or mainly manufactured	21,738	16,804	− 4,934
Other articles	631	596	− 35
Total Exports ...	589,652	440,971	−148,681
Bullion and Specie—			
Imports	88,221	134,912	+ 46,691
Exports	101,500	164,912	+ 63,412

Movements of Shipping in the Foreign Trade—	Number of Vessels.	Thousand Net Tons.	Number of Vessels.	Thousand Net Tons.	Number of Vessels.	Thousand Net Tons.
Entered with cargoes—						
British	30,670	40,381	28,817	37,990	−1,853	− 2,391
Foreign	25,766	22,708	25,847	22,022	+ 81	− 686
Total entered ...	56,436	63,089	54,664	60,012	−1,772	− 3,077
Cleared with cargoes—						
British	37,661	41,306	35,321	37,785	−2,340	− 3,521
Foreign	21,549	22,026	19,504	19,904	−2,045	− 2,122
Total cleared ...	59,210	63,332	54,825	57,689	−4,385	− 5,643

Turning to the detailed records of trade, and comparing last quarter with the corresponding quarter of 1931, we find an increase in quantity of 6 per cent. in the retained imports of grain and flour, and an increase of 2 per cent. in respect of meat. In the case of grain and flour the increase was mainly in the imports of wheat and maize, barley and oats showing considerable declines, while as regards meat there was a slightly smaller quantity of beef and of mutton and lamb imported, but an increase of 17 per cent. in the imports of bacon and hams. Retained imports of butter increased by 11 per cent.; of raw sugar by 72 per cent., the increase coming almost entirely from foreign countries; and of tea by 6 per cent., there being a decrease in the imports from foreign countries and a substantial increase in those from both India and Ceylon.

With regard to raw materials, retained imports of raw cotton increased by 61·1 million lbs. (22 per cent.) as compared with a year ago, while imports of sheep's and lambs' wool increased by 8·6 million lbs. (4 per cent.). Imports of other textile materials—raw silk, silk cocoons, waste, etc., flax, hemp, and jute—were substantially higher, as also were imports of phosphate of lime, copper ore, copra, palm kernels, coconut oil, palm oil, wet hides, wood pulp, and crude zinc. Iron ore, rubber, and tin ingots, bars, etc., were the only important raw and semi-manufactured materials to show any appreciable decrease.

The largest decreases in values among the groups of manufactured articles were recorded in the three groups most affected by the Abnormal Importations Orders, viz. apparel (£3,221,000), woollen and worsted yarns and manufactures (£2,681,000), and cotton yarns and manufactures (£1,749,000). There were also decreases exceeding £1,000,000 in value in the imports of miscellaneous manufactured articles, largely skins and furs; of silk yarns and manufactures, the decline affecting the imports of piece goods wholly of silk as well as those of silk mixtures, which were mainly subject to additional duties under the Abnormal Importations Orders; and of iron and steel and manufactures thereof. Retained imports of iron and steel declined from 607,000 tons to 551,000 tons, there being increased imports of sheet bars and tinplate bars (161,000 tons as compared with 106,000 tons) and large decreases in respect of both finished iron and steel goods and rolling-mill products. There was a reduction of 11 per cent. in the retained imports of machinery, and a striking reduction from 1,118 to 212 in the number of motor-cars and chassis imported and retained. Retained imports of refined petroleum were slightly less than in the first quarter of 1931.

As regards domestic exports, no improvement was shown in respect of the heavy industries during the first three months of this year, but, on the other hand, exports tended to approximate closer to those of the corresponding period a year earlier than had been the case during the preceding quarters. This did not, however, apply to the exports of locomotives, which declined from 8,500 tons to 1,200 tons, or of new ships and boats, exports of which declined from £2,433,000 to £346,000, the decline in tonnage being proportionately greater. Exports of coal amounted to 9,472,000 tons, or 9 per cent. below those of a year ago, but shipments of bunker coal (3,770,000 tons) were somewhat greater. As already indicated, some of the principal export markets on the Continent were much affected by the quota restrictions now in force, but there were increases in exports to Scandinavia and to South America. Exports of iron and steel goods as a whole declined by less than 2 per cent., there being a considerable decline in the exports of railway material but substantial increases in the exports of galvanized sheets and of tinned plates. The increase in the case of galvanized sheets was mainly to India, our largest market, and in the case of tinned plates to Japan, China, and Australia. Exports of machinery were 6 per cent. smaller, notwithstanding substantial increases in the exports of machine tools and textile machinery.

Among textiles, there was a marked improvement in the cotton trade, as regards both yarns and piece goods; a substantial, though smaller, increase was recorded for linen and jute piece goods and for cordage; and a slight increase in respect of artificial silk tissues. Exports of woollen and worsted tissues were some 12 per cent. less than a year ago, but exports of tops and yarns increased very substantially. The quantity of wool tops exported (11·5 million lbs.) was much greater than in any quarter during recent years, a large part of the increased exports going to Germany. As regards cotton yarns, the quantity exported last quarter was larger than in any quarter since the corresponding quarter of 1929, while exports of cotton piece goods were much larger than in any quarter since the second quarter of 1930. The increase in both cases was due mainly to increased purchases by India and China; as regards piece goods, exports to India (126 million sq. yds.) and to China and Hong Kong (76 million) represented over one-third of the total exports, which amounted to 563 million sq. yds., as compared with 438 million a year earlier. The total increase in the value of the exports of cotton yarns and manufactures was £1,448,000.

Apart from textiles, paper and cardboard was the only group in which there was an increase in value as compared with the first quarter of 1931, this being due to increased exports of newsprint.

Though no other group showed an increase in total value, there was a considerable expansion in the exports of chemicals, notably of copper sulphate, sodium compounds, and glycerine, while among miscellaneous manufactured articles exports of linoleum and oilcloth showed a substantial increase. Brass manufactures showed a large increase, and copper manufactures a small decline. Tin in blocks, ingots, etc., declined from 4,916 to 2,046 tons due to the practical cessation of shipments to the United States, which a year ago took over half the total exports.

Imports and exports of bullion and specie have been very heavy during the quarter, imports amounting to £48,812,000, of which over half came from India, and exports to £53,104,000, of which 80 per cent. went to France. The adverse balance on merchandise account was reduced by more than £4,000,000, comparing last quarter with a year earlier, but taking the twelve months ended March, there was an increase as compared with the preceding twelve months from £380,620,000 to £404,819,000. If imports and exports of gold and silver bullion and specie be added to these figures, the excess of imports over exports shows an increase from £367,340,000 to £374,819,000.

The general level of *wholesale prices*, as measured by the Board of Trade index-number, shows little change during January and February from the level at December, 1931. At that date the index-number stood at 88·6 (1930 = 100). Prices on balance showed no change in January, 1932, and in February declined to 88·1 or 0·6 per cent. The index-number is still below the level of a year ago (88·9) to the extent of 0·9 per cent. Prices generally, however, are rather more than 7 per cent. higher than in the period (Sept. 1–19, 1931) immediately preceding the date when the gold standard ceased to govern currency issues. Comparing the price levels for August, 1931, and February, 1932, the principal increases are cereals (18·1 per cent.), other metals and minerals (16·7 per cent.), cotton (14·0 per cent.), other textiles (14·2 per cent.), and articles of food other than cereals and meat (11·7 per cent.). The only group showing any appreciable fall is that for meat and fish, which has declined nearly 10 per cent. In this group the index-number for February, 1932 (74·9), is 14·5 per cent. below that for a year ago. Prices of bacon have advanced somewhat since the end of the year, but the prices of fresh and frozen meat have continued to fall. There has been a decline in the price of Indian tea (London auctions) of nearly 14 per cent. during the last two months. It is to be noted that the Board of Trade have now advanced the base year on which their index-number is calculated from 1924 to 1930, and have replaced certain price quotations by others (coal, frozen beef, and cocoa). The group index-numbers with 1913 and 1924 as the base years continue to be given in the monthly article in the *Board of Trade Journal.* The index-numbers on the three bases are set out below for the three months December, 1931, January, 1932, and February, 1932.

Base Year.	Month.	Food.	Not Food.	All Articles.
1930 = 100	Dec. 1931	89·3	88·4	88·6
	Jan. 1932	90·7	87·7	88·6
	Feb. 1932	90·2	87·2	88·1
1924 = 100	Dec. 1931	67·8	61·5	63·7
	Jan. 1932	68·7	61·0	63·7
	Feb. 1932	68·7	60·7	63·4
1913 = 100	Dec. 1931	112·7	102·1	105·8
	Jan. 1932	114·3	101·3	105·8
	Feb. 1932	114·2	100·7	105·3

The *Economist* index-number (1927 = 100), which had risen to 65·8 at the end of December, 1931, from its low level of 62·3 in the preceding August, advanced to 66·3 (or 0·8 per cent.) at March 9, 1932. The increase was due to rises in the two food-groups "cereals and meat," and "other food," which had advanced 7·7 per cent. and 3·7 per cent. respectively. Over the period September, 1931, to March, 1932, the index-number for cereals and meat registers an increase of 15·2 per cent., and as the prices of meat declined during the period the actual increase in cereals is greater than the percentage recorded. The general price level at March 9, 1932, is practically the same as that recorded at the end of March, 1931, viz. 66·2.

As measured by the *Statist* index-number, wholesale prices showed a slight fall (0·8 per cent.) at the end of January, 1932, as compared with the end of December, 1931. The general level, however, advanced during February, and at the end of the month the index-number showed a rise of 2·4 per cent. on the previous month's figure and was higher than at any point during 1931. The index-numbers for the end of January and February, 1932, were 85·7 and 86·7 respectively (average of 1866–77 = 100), and at the end of February, 1931, was 85·5.

The general rise in the level of prices since the end of August is in contrast with the trend of prices in the gold-standard countries, as may be seen from the figures below.

Average of 1913 = 100.

	Board of Trade.	*Economist*	*Statist.*	U.S A. (Bradstreets).	France (*Stat. Gen*).	Germany (*Stat. Reichsamt.*).
August, 1931 ...	99·5	85·7	93·1	92·2	455	110·2
February, 1932 ...	105·3	92·2	102·0	79·5	421	100·0*

* Figure for January, 1932.

There was some decline in *shipping freights* in January, 1932, with a smaller recovery in February. According to the index-number compiled by the Chamber of Shipping and published in the *Statist*, freights fell from 21·2 in December, 1931, to 18·4 in January (1920 = 100), or 13 per cent., and rose slightly more than 5 per cent. in February (18·4 to 19·3). The index-number for the year 1931 is now available, being 19·9, or 4 per cent. above that for 1930, but 20 per cent. below that for 1929.

During the two months January and February, 1932, there was an improvement in the monthly valuation of *Stock Exchange Securities* as measured by the *Banker's Magazine* index-number of Stock Exchange values to the extent of 3·2 per cent. The improvement was principally in the Fixed Interest Stocks, the index-number for which advanced from 102·2 in December, 1931, to 106·5 in February, 1932. The index-number for the value of the Variable Dividend Securities rose only from 90·7 to 91·7. The combined index-number (December, 1921 = 100) was 101·7 at February 18, 1932, and 100·9 at January 18, 1932, and is still 9·7 per cent. below the values of February, 1931, when the index-number stood at 112·6. The index-numbers given below show that values have not yet returned to the level of August, 1931.

(December, 1921 = 100.)

	Fixed Interest Stocks.	Variable Dividend Securities.	Total.
August, 1931	107·2	98·2	104·3
September, 1931	103·5	89·5	99·0
October, 1931	104·2	100·6	103·1
November, 1931	104·8	99·4	103·1
December, 1931	102·2	90·7	98·5
January, 1932	104·7	92·8	100·9
February, 1932	106·5	91·7	101·7

According to the Ministry of Labour index-number of *retail prices* of articles of working-class consumption, food prices on the whole remained stationary during January, but declined somewhat during February, and at March 1, 1932, were 29 per cent. above the level of July, 1914. At January 1, 1932, the increase was 31 per cent. Prices of eggs and butter have declined on balance during the period, and the price of potatoes, though higher than at the beginning of the year, eased somewhat during February. Compared with a year ago the index-number for food shows at the beginning of March a fall of 3·7 per cent., and has risen only 0·8 per cent. since September, 1931. Articles of clothing of working-class consumption appear to have declined about 5 per cent. during the last twelve months. The index-number for all items (food, rent, clothing, etc.), which at the beginning of March, 1931, was at 150 and had fallen to 145 at the beginning of August, was at 147 at the beginning of January and February of this year, and was at 146 on March 1, 1932. Percentage increases for certain months since August, 1931, are shown below.

	Sept. 1, 1931.	Nov. 1, 1931.	Dec. 1, 1931.	Jan. 1, 1932.	Feb. 1, 1932.	March 1, 1932.
Food prices	28	30	32	31	31	29
All items (food, clothing, rent, fuel, etc.)	45	46	48	47	47	46
All items (a year earlier) ...	*57*	*57*	*55*	*53*	*52*	*50*

The latest return relating to *retail sales* prepared by the Incorporated Association of Retail Distributors and the Bank of England, and published monthly in the *Board of Trade Journal*,[1] enable a comparison to be made between the sales in the two complete twelve-month periods, February, 1930–January, 1931, and February 1931–January, 1932. The total value of retail sales in the later period show a fall of 4·9 per cent. compared with the earlier, sales of food and perishables showing a decline of 5·2 per cent., and sales of other merchandise a decline of 4·5 per cent. The decline was greatest over the whole period in Central and West End London District (8·0 per cent.) both for food and other merchandise, and was least in the South of England (3·1 per cent.). The kinds of merchandise the sales of which show the largest decline were sports and travelling (7·9 per cent.), fancy goods (6·4 per cent.), fancy drapery (6·0 per cent.), and boots and shoes (5·9 per cent.). Bearing in mind the fall in prices over the period the figures do not point to any drop in the consumption of food or other merchandise. The figures for the latest month (January, 1932) as compared with the corresponding month in 1931 show a fall of 4·7 per cent. in the sales of food and 6·7 per cent. in sales of merchandise. The fall was greatest as regards merchandise in Suburban London (9·3 per cent.) and Central and West End London (8·7 per cent.), and as regards articles of food was greatest in Central and West End London (8·6 per cent.). The number of persons employed showed a decline (0·2 per cent.) on the whole as compared with a year ago, but the districts outside London showed increases.

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[1] *See* pp. 143–4 of Part I. *J.S.S.*, 1932.

The following table gives for the principal countries the percentage increases, on July, 1931, and, on the latest available date, of the retail prices of food and other items compared with the prices at July, 1914.

	Retail Prices of Food at		Retail Prices of All Items at		Date of Latest Return.
	July, 1931.	Latest date available.	July, 1931.	Latest date available.	
Great Britain	30	29	47	46	Mar. 1, 1932
Overseas Dominions, etc.					
Australia	25	25	25 (figure for 3rd qr. 1931)		Jan. 1932
Canada	10	0	37	32	Feb. 1932
India (Bombay) *	0	2	8	10	,,
Irish Free State	43 †	55	57	65	Nov. 1931
New Zealand	18	18	45	42	Jan. 1932
South Africa	4	1	22	20	,,
Foreign Countries.					
Belgium	—	—	689	652	Jan. 1932
Czechoslovakia	17	8	4	2	Dec. 1931
Denmark	19	17	54	54	Jan. 1932
Egypt (Cairo)	—	17	34	36	Oct. 1931
France (Paris)	517	461	465 ‡	431	Feb. 1932
Germany	30	14	37	22	,,
Holland (Amsterdam) ...	—	—	54 §	45	Dec. 1931
Italy	342	341	282 (for July–Dec. 1931)		Jan. 1932
Norway	40	35	52	50	,,
Spain (Madrid)	93	105	—	—	Dec. 1931
Sweden	30	29	58	57	,,
Switzerland	40	32	50	44	Jan. 1932
United States	17	7	50 §	46	,,

* Native families. † Figure for August.
‡ For third quarter. § Figure for June.

Unemployment at the end of February, 1932, was on the whole somewhat worse than in December, 1931. The proportion unemployed in Great Britain in the insured industries at February 21, 1932, was 21·9 per cent. compared with 20·8 per cent. at December 21, 1931. There is always a considerable decline in employment at the end of the year. The resumption of work after the Christmas and New Year holidays has the effect of cancelling most of this increase in the numbers out of work as a general rule, but at January 25 the proportion out of work was as high as 22·3 per cent. and, as stated above, had only fallen to 21·9 at February 21. Bearing in mind that the figures are likely to be affected to some extent by the legislative and administrative changes, the total number out of work is to some extent in excess of the figure represented by this percentage. In the House of Commons on February 11 last the Minister of Labour stated that in the last three months approximately 130,000 had ceased to register at Employment Exchanges after disallowance of benefit or transitional payments, but added that "it is clear that nothing approaching this number should properly be included in a total of the unemployed." The weekly issue of figures giving the numbers out of work as shown by the registers of Employment Exchanges has been discontinued since December 21, 1931, and such figures are now only issued monthly. Those issued for January and February are given below for Great Britain with corresponding figures for December, 1931, and February, 1931.

Date.	Wholly Unemployed.	Temporarily Stopped.	Persons normally in Casual Employment.	Total.
Dec. 21, 1931 ...	2,002,464	403,432	104,025	2,509,921
Jan. 25, 1932 ...	2,131,298	496,298	100,705	2,728,411
Feb. 22, 1932 ...	2,112,927	486,599	101,647	2,701,173
Feb. 23, 1931 ...	*1,888,716*	*613,692*	*115,250*	*2,617,658*

No very considerable change for the better is apparent in any of the important industries since the end of 1931, but there has been some improvement in the cotton trade over the last few months and employment in that industry is much better than a year ago, and indeed better than at any time in 1931, although some allowance must be made for the effect of the new administrative conditions of benefit, which would operate noticeably on the recorded numbers out of work in such an industry as the cotton trade.

From reports obtained by the *Ministry of Labour Gazette* from official German sources it would appear that unemployment in Germany continued to increase during January and February, 1932, and at the end of the latter month the number of persons reported by the Employment Exchanges as *available for and seeking work* had risen to the high total of 6,207,070, of which number 6,127,808 were definitely recorded as unemployed and 3,525,504 as in receipt of either the standard or emergency benefit. These figures show an increase of rather more than a million in the number out of work over the figure for the corresponding date in 1931, although the numbers on benefit have only increased by about 28,500.

Returns from the German trade unions covering nearly 4,000,000 members show, similarly to the official returns, a continued rise in unemployment, the proportion out of work increasing from 38·9 per cent. at the end of November to 43·6 per cent. at the end of January, 1932. The proportion on short time increased from 21·8 per cent. to 22·6 per cent. over the same period.

In France the results of the special monthly investigation covering mining, industrial, transport, and commercial undertakings employing at least 100 workers show that at the beginning of February, 1932, the numbers employed declined 14·69 per cent. compared with February, 1931, and the percentage of workpeople in these establishments on short time to such an extent as to bring their working hours below 48 per week was 56·35. Of this 56·35 per cent., 39·4 were working 40 hours or less. In January a decline of 13·4 per cent. was shown compared with January, 1931, and it is clear that there is no cessation in France to the increase in unemployment and in the amount of short time worked, which was continuous throughout 1931. It would appear that the estimate made in Part I of the *Journal* of at least 1,000,000 out of work and 3,000,000 on short time should be increased somewhat.

In Belgium unemployment has continued to increase. At the end of December, 1931, out of 757,500 members of unemployment insurance societies, 17·0 per cent. were reported as out of work compared with 12·6 per cent. at the end of the previous month and 9·2 per cent. at the end of December, 1931. Rather more than 20 per cent. of the members were employed intermittently during December, and these lost about one-fifth of the aggregate possible working time.

In Sweden employment improved somewhat during January and was slightly better than at the end of December, 1931, the percentage of trade unionists unemployed having declined from 26·6 to 24·2. In Denmark employment declined, the proportion out of work rising from 32·2 per cent. to 35·1 per cent. according to returns from Exchanges and Unemployment Insurance Funds. In Norway about 20 per cent. of trade unionists were out of work at the end of the year.

Employment continued to decline in Italy, and the statistics of the National Social Insurance Fund recorded 982,321 as unemployed at the end of December, 1931, and 1,051,321 at the end of January, 1932—higher figures than have been previously recorded. At the end of January, 1931, the number out of work was 722,612.

Employment in the United States continues to decline on the whole. Statistics of the numbers employed and wages paid by about 50,000 establishments with four and a half million workpeople in fifteen principal industrial groups showed a decrease over the two months December, 1931, and January, 1932, of rather more than 3 per cent. in the numbers employed and 7 per cent. in the wages paid as compared with November, 1931. The index-number of employment in manufacturing industries alone (average in 1926 = 100) rose from 65·4 in November, 1931, to 66·7 in December, 1931, but fell to 64·8 in January, 1932. The figure for January, 1931, was 74·6, for January, 1930, 90·2, and for January, 1929, 95·2. Returns from trade unions affiliated to the American Federation of Labour in twenty-four cities confirm the amount of unemployment indicated by the official figures, as 31 per cent. of these trade union members were reported as out of work both in January and February, 1932.

Employment in Canada has continued to decline, partly owing to seasonal causes, and the index-number of employment (average of 1926 = 100) fell from 99·1 at the beginning of December, 1931, to 91·6 at the beginning of January and to 89·7 at the beginning of February, 1932, the lowest figure yet recorded. At the beginning of February, 1931, the index-number was 100·7.

Employment in Austria, Holland, and Switzerland continues to be bad, and neither in Europe nor in the United States or Canada are there any signs, so far as unemployment statistics show, of an improvement in the industrial situation.

The Ministry of Agriculture's annual and monthly index-numbers for produce sold off the farm and for purchased feeding stuffs and fertilizers for the years 1929–31 and for the first three months of 1931 and 1932 are given below (1911–13 = 100):—

	Annual Index-Numbers.			Monthly Index-Numbers.					
	1929.	1930.	1931.	Jan. 1931.	Jan. 1932.	Feb. 1931.	Feb. 1932.	March 1931	March 1932
Produce	144	134	120	130	122	126	117	123	113
Feeding stuffs	139	96	83	78	95	77	97	85	102
Fertilizers	100	101	96	102	91	100	91	100	91

It will be seen that the prices of agricultural products in 1931 were only 20 per cent. above the level of the base years 1911–13, this being the lowest figure reached since the war. In the previous year the figure was 34 per cent., while the average for the three years 1927–29—that is, before the present depression—was 45 per cent. above the pre-war base. A comparison of the average prices ruling in 1931 with those prevailing in 1927–29 shows a decline of about 17 per cent., while the drop as between 1930 and 1931 was 10 per cent. In 1930, arable produce was most affected, but in 1931, wheat, sheep, pigs, milk, and hay contributed largely to the fall in the index-number.

Whilst the farmer has had to accept lower prices for produce sold off the farm, there has been some compensation in the reduced prices he has had to pay for imported or manufactured feeding stuffs and fertilizers. The feeding-stuffs index, which includes imported barley, oats, maize, oilcakes, milling offals, and meals, stood in 1929 at 139 (1911-13 = 100), but declined in 1930 to 96 and in 1931 to 83, a drop as between 1929 and 1931 of 40 per cent. All the commodities in the group were lower, but the heaviest decline occurred in maize. In the case of artificial fertilizers, prices were on the average near the pre-war level throughout these three years, but individual items varied, nitrogenous manures being very cheap while phosphates and potash were above pre-war prices.

In the first three months of 1932, the average of the monthly index-number was 117, which though below the 1931 annual figure was three points higher than the average for the last quarter of that year. Agricultural prices are, however, very seasonal, so that the monthly index-numbers cannot be regarded as a running series in quite the same way as other index-numbers, and it is more accurate to compare the position with corresponding months of previous years. On this basis, there was a decline of 7 per cent. as compared with the first quarter of 1931, and of 20 per cent. as compared with the first three months of 1927–29. To some extent, this was due to a drop in the contract prices of milk, though live-stock, particularly sheep and pigs, as well as eggs and butter, were cheaper than in the early part of 1931. Potatoes were the only product that showed a material increase, these owing to a very poor crop having nearly doubled in price.

While the farmer has continued to receive less on the average for his produce, it will be seen that there has been a definite rise in feeding stuffs in 1932 which has lessened the advantage he had in this respect during a good part of last year. This increase seems to have been mainly due to smaller world crops of barley and oats which raised the prices of these cereals, and also to the approaching exhaustion of the heavy supplies of maize from Argentina. There was also some improvement in wheat prices which affected the cost of milling offals. Fertilizers were somewhat cheaper. Although the changes in these items of cost are regularly calculated, they cannot be directly related to the selling prices of agricultural products: they merely indicate changes in an annual outlay which in the aggregate is possibly some 20 or 25 per cent. of the value of the produce.

Since the last mention of the Ministry of Agriculture's Economic Series was made in the *Journal*, three further numbers have appeared.

The Report on the Marketing of Sheep, Mutton, and Lamb (Economic Series No. 29) is in the traditional style of the commodity surveys. Supplies, demand, and prices are briefly reviewed and followed by an exhaustive description of current marketing conditions and practice. The organization in certain overseas countries is touched upon. This well-illustrated Report finishes with concluding observations, seventeen tables and an appendix giving classes and grades of sheep and lambs in the United States. Economic Series No. 33 is entitled "The Agricultural Marketing Act, 1931," and seeks to explain that somewhat complicated measure. A fuller notice of this publication appeared in the *Economic Journal*, No. 164 (Dec. 1931). The last Report to appear was that on the "Organization of Potato Marketing" (Economic Series No. 34). The substance of this publication is new to the Series and is wholly concerned with the structure of the marketing system, not only in this country (where confusion seems to reign) but overseas as well. The problem of bringing order into the marketing system of the United Kingdom in respect of potatoes is discussed at length.

Elsewhere in this *Journal* reference has been made to the completion of the publication of the Final Reports on the Third Census of Production (1924). While these were passing through the last and most difficult stages of revision and verification, the Fourth Census was being taken last year in respect of the year 1930. Unfortunately that year has proved to be not a very satisfactory year for constructing a return of output, for, whereas a return at the peak of a trade movement or one at the bottom gives a picture of a definite condition, one made while we are still on the slippery slope of a decline does not give a sound basis for comparison. That, however, could not be foreseen when the arrangements for the Census were being made. The results of the Fourth Census, such as they are, are being published with admirable promptitu ments to the *Board of Trade Journal.* So f last December, the third in January, tw March, and one in April. Preliminary rep 43 trades, not in any regular order but as got ready. One reason why it has been possible cation is that firms employing not more than ten average in 1930 were exempted from the obligatio detailed returns; such firms in 1924 only employed about 5 of the total number employed in industry. The returns fo two Censuses are, therefore, comparable with sufficient accurac Generally speaking the net output per head of persons employed is less in 1930 than in 1924, and in this the fall in prices would be a factor. In some cases there are surprising increases; in the oil and tallow trades from £366 to £628 and in petroleum refining from £503 to £926, exclusive of estimated duty, but in the former case the excluded small firms were responsible for 17·5 per cent. of the output in 1924. At blast furnaces net output went up from £195 to £204, while at steel works it decreased from £202 to £187, and there was an increase in tubes, while tinplate and wire declined. In electrical engineering there was practically no change, though it is estimated that output was "substantially greater in volume" than in 1924. Perhaps the most serious reductions were in cotton spinning from £187 to £104 and in cotton weaving from £133 to £118.

To review a book which has passed through many editions seems futile if not impertinent, but we must offer our congratulations to our Fellow, Mr. L. L. Price, in that his *Short History of Political Economy in England* (Methuen & Co., Ltd., 6*s.*) has now reached its fourteenth edition. It appears to have been very thoroughly revised as regards the matter that appeared in the earlier issues, and a new part, "Postscript and Sequel, Developments in Various Directions," has been added, which increases the former contents by rather more than one-half. Dipping at first casually into the book the present writer was led on page by page, more and more absorbed, until the whole volume was read from end to end. What a pageant of names, what a turmoil of controversies it has called up! First, the almost legendary figures of the past—Adam Smith and the division of labour, Malthus and the principle of population, Ricardo and the theory of rent, John Stuart Mill and the theory of value, Cairnes and Cliffe Leslie on economic method, Bagehot and the money market, Jevons and index-numbers, Fawcett and Toynbee introducing social reform. Those were the heroes whose exploits fur-

rice's original book. In the second army
umber of figures who seem to us more of
wrote and moved among us in our own day.
ed by functional separation, and Mr. Price
regiments each playing its own co-operative
gn against ignorance. First, however, come two
, each doubling the part of theorist, historian, and
n—Gonner and Smart. Then in the regiment of
history we find Thorold Rogers, Ashley, Cunningham,
Knowles, and George Unwin. Giffen and Booth develop
at we may call the supply corps of economics—statistics—to-day
perhaps the favourite resort of recruits. The old guard of the theorists is now reinforced by Sidgwick, Nicholson, Edgeworth, and Marshall. Other names of writers still with us appear incidentally, but they are not yet in the canon, and with a flick of the head Spahn and Veblen, who would disrupt the whole organism of economics, are tossed aside. One is glad to see that Mr. Price forcibly deflects the "formidable ruthless rifle" which Dr. Cannan aimed against Marshall, and that despite all "censorious criticism" the great Cambridge economist is left occupying in solitary grandeur the chair of succession to the giants of the classic past. Finally, in the last twenty or thirty years economic theory and economic history as well as statistics have been dragged into the political arena. Mr. Price has his own definite views as to the practical applications which may be made of academic thought, but he has never allowed himself to be drawn into controversial depreciation of those who hold opposite opinions. Next to the great clarity and sinewy succinctness of his writing, his unswerving fairness is a chief attraction of Mr. Price's admirable book. And one more "finally." We are especially grateful to our author for his personal descriptions of the individuals whose work he analyses. He makes us feel that we are not dealing with the abstract minds of theorists, historians, or mathematicians, but with flesh and blood men who, though liable to error, were capable of leadership in thought and action.

After twenty-four years' service Mr. A. W. Flux, C.B., retired on attaining the age-limit on May 3 from the post of Assistant Secretary for the Statistical Department of the Board of Trade. His successor is Mr. Hector Leak, also a Fellow of this Society.

The Study Group, in January, was addressed by Mr. B. C. Wallis (Chief Examiner to the L.C.C.) on "The Measurement of Ability in

Children." There were 14 memb
Irwin opened a vigorous discussion.

Mr. Neumann read a paper in Febr
of Demand for Coal," dealing with the
economic aspect, and in March, Miss B. N.
ticularly interesting paper, illustrated with a sk
on " The Value of Craniometry in Measuring Inte
clear that much work has yet to be done before c
provide an adequate indication of intelligence, and the
portion of those present who participated in the discussio
evidenced the interest aroused.

A cordial invitation is extended to all interested in the Group's work, and intending members are requested to communicate with the Hon. Sec., R.S.S. Study Group, 9 Adelphi Terrace, W.C. 2.

We record, with great regret, the death, on April 5th, of Mr. James Bennett Guild, in his forty-second year. Mr. Guild was elected to Fellowship in 1915, soon after he had relinquished a lectureship in Political Economy at Edinburgh University in order to take up an appointment in the statistical section of the Ministry of Food, of which section he ultimately became the chief. One outcome of his experience there was a valuable paper read and discussed before the Society in 1920, on " Variations in the Number of Livestock and in the Production of Meat in the United Kingdom during the War." In 1921 he left the Government service to become statistician to the National Farmers' Union of which he was made a joint general secretary in 1923. He was a member of the Society's Council from 1922 to 1925. Mr. Guild's untiring industry and devotion to his work were undoubtedly among the causes of his early death. He never spared himself, and notwithstanding the continuous and heavy labour entailed by his work for the Union, always found time to contribute the notes on prices and employment in the Society's *Journal*, for which he was responsible during the twelve years up to last autumn.

AND ECONOMIC ARTICLES IN RECENT PERIODICALS.

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Bankers' Magazine—

January, 1932—The banking year. The financial outlook.

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Revista de Ciencias Económicas, December, 1931—La influencia de la depreciación monetaria en el balance de pagos del país : *A. Eduardo Sanguinetti.*

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Bulletin de l'Institut des Sciences
Le chômage en Belgique en 193
culture en Belgique en 1931 : *J.*
charbonnière belge et la crise : *Charle*
Revue du Travail, January–February, 1932—
nationale du travail : *M. E. Mahaim.*

DENMARK—

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Prisbevœgelser : *T. V. Lo.*

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L'Égypte Contemporaine—

December, 1931—The "sterling" crisis, its relation to the supposed gold shortage : *S. Lackany Bey.* La crise de l'industrie du coton et influence sur cet article, du developpement de la soie artificielle : *F. Carli.*

January, 1932—Index-numbers of wholesale prices in Egypt : *M. El Darwish.* Le déséquilibre de la balance économique en Égypte : *Marc Habachi.*

FRANCE—

L'Avenir du Travail, Nos. 1–3, 1932—Le problème d'une politique internationale des migrations de travailleurs : *William Oualid.*

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Journal des Économistes—

February, 1932—Les difficultés présentes et les absurdités préconisées : *Edouard Payen.* Une nouvelle organisation politico-commerciale en Europe Centrale : *Elemer Hantos.*

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Journal de la Société de Statistique de Paris—

January, 1932—Le rendement des valeurs à revenu variable à la Bourse de Paris dans les dix dernières années (1922–31) : *René Thery.*

March, 1932—La diminution du commerce extérieur de la France. La balance commerciale en Allemagne et en France : *Richard Bloch.*

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November–December, 1931—Les caractères nouveaux du cycle actuel : *Maurice Ansiaux.* L'assurance-chômage est-elle la cause du chômage permanent? *Roger Picard.* Les investment trusts aux États-Unis et la crise de 1929–30 : *Philippe Schwob.*

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December, 1931—Grundsätzliches zur Neubasierung der Lebenshaltungskosten-Indexziffer : *Franz Rompe.*

January–February, 1932—Einkommensteuerstatistik und Wohlstandsverteilung : *Christian Bruckner.*

Vierteljahrshefte zur Konjunkturforschung—

Heft 4, *Teil A,* 1932—Die Weltkonjunktur Ende Februar 1932. Die Konjunktur in Deutschland Ende 1932.

Heft 4, *Teil B,* 1932—Die Konjunktur einzelner Wirtschaftszweige. Neuerscheinungen zur Konjunkturforschung.

ITALY—

Le Assicurazioni Sociali, No. 6, 1931—Le cause della disoccupazione. Risultati di indagini nella Svezia : *B. de Hammarskjöld.* Disoccupazione e assicurazioni sociali nel Canada : *Gerald H. Brown.* (A *Supplement* contains these articles in the original German and English.)

Giornale degli Economisti e Rivista di Statistica—

December, 1931—Recenti teorie monetarie del ciclo : *Bruno Foà.*

January, 1932—Del concetto di elasticità in economia : *Lionello Rossi.* "Homo oeconomicus" e stato corporativo. Chiarimento necessario : *Lello Gangemi.*

February, 1932—Nuovi problemi della teoria del commercio internazionale : *G. del Vecchio.* Sul metodo della scienza economica : *Bruno Foà.* I limiti di convenienza nei prestiti esteri : *Ernesto D'Albergo.*

ITALY—*Contd.*

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Kyoto University Economic Review, December, 1931—On the differential birth-rate by classes: *Y. Takata.* Interrelation between the wealth and the density of population in Japan: *S. Shiomi.*

MEXICO—

Boletin de la Sociedad Mexicana Geografia y Estadistica, January–April, 1931—Datos demográficos sobre mortalidad infantil: *Francisco Valdes.*

INTERNATIONAL—

International Labour Review—

January, 1932—International measures to create employment: a remedy for the depression: *W. Woytinsky.* Labour conditions in French agriculture: *M. Augé-Laribé.* Social economic planning: *G. A. Johnston.*

February, 1932—A new policy for agricultural labour: *J. F. Duncan.* The effects of rationalisation on employment: *R. Tremelloni.*

March, 1932—Prison labour: I. The seasonal emigration of Polish agricultural workers to Germany: II. *G. S. Rabinovitch.* The housing of agricultural wage-paid workers.

ADDITIONS TO THE LIBRARY.

Since the issue of Part I, 1932, the Society has received the publications enumerated below :—

I.—OFFICIAL PUBLICATIONS.

(a) United Kingdom and its several Divisions.

United Kingdom—

Agriculture, Ministry of. Bulletin No. 33. Pig-keeping costs : a report of an investigation carried out at the Lord Wandsworth Agricultural College, 1921–28. London : H.M.S.O., 1931. 9¾″ × 6″; v + 26 pp. 6*d.*

Colonial Office. Papers relating to the health and progress of native populations in certain parts of the Empire. London: H.M.S.O., 1931. 9¾″ × 6¼″; 191 pp. 3*s.*

Economic Advisory Council. Committee on the Fishing Industry. Report. London : H.M.S.O., 1932. 9¼″ × 6″; 204 pp. 3*s.*

Empire Marketing Board—

Australian and New Zealand fruit shipments. Report of an investigation . . . into the deterioration in transit of imported Australian and New Zealand fruit, 1927–30. London : H.M.S.O. 9¾″ × 7¼″; 64 pp. 1*s.*

Banana breeding at the Imperial College of Tropical Agriculture. By *E. E. Cheesman.* London : H.M.S.O., 1931. 9¾″ × 7¼″; 35 pp. 1*s.*

Production and trade of British Malaya, March, 1932. London : H.M.S.O., 1932. 9¾″ × 7¼″; 26 pp. 2*d.*

—— Malta, January 1932. London : H.M.S.O., 1932. 9¾″ × 7¼″; 15 pp. 2*d.*

Health, Ministry of—

Reports on public health and medical subjects—

No. 64. A report on tuberculosis, including an examination of the results of sanatorium treatment. By *A. S. Macnalty.* London : H.M.S.O., 1932. 9¾″ × 6″; viii + 172 pp. 3*s.*

No. 66. Incurable cancer : an investigation of hospital patients in Eastern London. By *Janet E. Forber.* London : H.M.S.O., 1931. 9¾″ × 6″; 59 pp. 1*s.*

Imperial Economic Committee. Twentieth report. The wheat situation, 1931. London : H.M.S.O., 1932. 9¾″ × 6″; 121 pp. 6*d.*

Medical Research Council. Medical uses of radium. Summary of reports from research centres for 1930. London : H.M.S.O., 1931. 9¾″ × 6″; 37 pp. 1*s.*

Overseas Trade, Department of—

Reports on commercial, financial, and economic conditions, as follows : Argentine Republic (Oct. 1931), 147 pp., 4*s.*; El Salvador (Nov. 1931), 33 pp.; Morocco (1930–31), 75 pp., 2*s.* London : H.M.S.O., 1932. 9¾″ × 6″. 6*d.*

Royal Commission on Licensing (England and Wales), 1929–31. Report. London : H.M.S.O., 1932. 9½″ × 6¼″; 307 pp. 4*s.* 6*d.*

Royal Commission on Unemployment Insurance. Appendices to the minutes of evidence. Part V. Statistical analyses by the Ministry of Labour of (I) persons insured against unemployment in Great Britain at July, 1930, and (II) persons on the registers of employment exchanges at February 2nd, 1931. London : H.M.S.O., 1932. 13¼″ × 8¼″; 65 pp. 5*s.* 6*d.*

(a) United Kingdom and its several Divisions—*Contd.*

United Kingdom—

Special Advisory Committee convened under the agreement with Germany concluded at The Hague on January 20th, 1930, Basle, December 23rd, 1931. Report. London: H.M.S.O., 1932. 9¾″ × 6″; 40 pp. 9*d.*

Trade, Board of. Third census of production of the United Kingdom (1924), Final report. Mines and quarries, the timber trades, manufactures of clay, stone, etc., and the building and contracting trades, public utility services and government departments, and an appendix containing general statistical tables. London: H.M.S.O., 1932. 9½″ × 6″; 473 pp. 7*s.*

Scotland—

Registrar-General's Office. Fourteenth decennial census of Scotland, 1931. Report. Vol. I. Part I. City of Edinburgh. Edinburgh: H.M.S.O., 1932. 13¼″ × 8½″; 38 pp. 2*s.*

(b) India, Dominions, Colonies, and Protectorates.

India—

Indian Central Banking Enquiry Committee, 1931. Vol. I. Part I. Majority report; Part II. Minority report. Calcutta, 1931. 9½″ × 6¼″; 2 vols. 5*s.* 3*d.* and 3*s.* 6*d.* respectively.

Punjab—

Board of Economic Inquiry—

Punjab village surveys. 3. An economic survey of Tehong, a village in the Jullandur District of the Punjab. Lahore: "C. & M. Gazette," 1931. 9¾″ × 6¼″; iii. + 345 pp. *R.* 4.

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Australia—

Census and Statistics, Bureau of. Wages and prices: a short examination of the accuracy of the retail price index-number used in the adjustment of wages. 2nd ed., revised. By *L. F. Giblin.* Canberra, 1931. 9½″ × 6″; 20 pp. 1*s.*

British East Africa—

Statistical Research, Department of. Memoir No. V. Analysis of crime statistics, Kenya Colony and Protectorate. 13″ × 8″; 48 pp.

Canada—

Statistics, Dominion Bureau of. Canada, 1932; the official handbook of present conditions and recent progress. Ottawa, 1932. 8½″ × 5½″; 192 pp. 25 c.

Irish Free State—

Industry and Commerce, Department of—

Census of production 1929, Reports. 29. Building and contracting trades. 30. Bricks, glass and monumental masonry industries. 31. Coach, wagon and motor body building and construction of motor vehicle industries. 32. Mines and quarries. 33. Local authorities and government departments. 5 parts, Dublin, 1932. 13″ × 8″.

(c) Foreign Countries.

Argentina—

Ministerio dé Hacienda de la Nacion—

El presupuesto general de 1932 y el estado presente de las finanzas nacionales. Buenos Aires, 1932. 10½″ × 7¼″; 62 pp.

La accion de emergencia en el problema monetario. Buenos Aires, 1932. 10½″ × 7¼″; 25 pp.

(c) **Foreign Countries**—*Contd.*

Argentina—*Contd.*

Santa Fé. Dirección General de Estadistica. La cosecha agricola 1930–31. Cifras retrospectivas. Santa Fé, 1931. 10″ × 6¼″; 52 pp.

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Czechoslovakia—

Office de Statistique. Associations professionnelles d'ouvriers et d'employés (fonctionnaires) au cours des années 1921 à 1927. Prague, 1931. 12″ × 9″; xxiv + 85 + 123 pp. 30 *k*č.

Egypt—

Département de la Statistique Générale. Statistique des sociétés anonymes par actions travaillant principalement en Egypte au 31 décembre 1928. Cairo, 1932. 12″ × 8¼″; vi + 373 pp. *P.T.* 30.

France—

Ministère des Travaux Publics. Statistique de la production et de la distribution de l'énergie électrique pour l'année 1929. Paris, 1931. 8½″ × 5½″; 18 pp.

Jugoslavia—

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Prethodni rezultati popisa stanovništva od 31 marta 1931 godine u kraljevini Jugoslaviji. Belgrade, 1931. 12″ × 9¼″; 34 pp.

Statistički pregled kraljevine Jugoslavije po banovinama. Belgrade, 1931. 12″ × 9¼″; 30 pp.

Mozambique—

(A number of brochures dealing with the various aspects of national life and national economy, rail communications, etc., in the Portuguese colony of Mozambique, prepared for the French Colonial Exhibition of 1931.) Lourenço Marques: Imprimerie Nationale. 9¾″ × 6½″. 1931.

Netherlands—

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Bern. Mitteilungen des Statistischen Bureaus des Kantons Bern—

8. Die Vererbung des bäuerlichen Grundbesitzes in der Schweiz. 136 pp.
9. Ein Beitrag zur Konjunkturbeurteilung und Standortsorientierung in der Viehwirtschaft. 139 pp.
10. Die gewerblichen Bürgschaftsgenossenschaften in der Schweiz. 90 pp.

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United States—

Agriculture, Department of. Statistical Bulletin No. 34. Corn futures; volume of trading, open commitments and prices, from January 3, 1921, to December 31, 1929. Washington, 1931. 9¼″ × 6″; 201 pp. 35 *c.*

Children's Bureau. Family welfare. Summary of expenditures for relief, mothers' aid, veterans' aid. Washington, 1931. 9¼″ × 6″; 62 pp. 15 *c.*

(c) **Foreign Countries**—*Contd.*

United States—*Contd.*

Federal Trade Commission. Resale price maintenance. Report. Part II. Commercial aspects and tendencies. Washington, 1931. 9″ × 6″; 215 pp. 35 *c.*

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Bulletin No. —546—Wages and hours in rayon and other synthetic yarn manufacturing, 1930. 31 pp. 10 *c.*

—547—Wages and hours of labor in the cane sugar refining industry, 1930. 27 pp. 10 *c.*

—548—Decisions of courts and opinions affecting labor, 1929–30. 521 pp. $1.

—557—Wages and hours of labor in the men's clothing industry, 1911–30. 59 pp. 15 *c.*

—558—Labor conditions of women and children in Japan. 102 pp. 20 *c.*

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(d) **International.**

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An international enquiry into costs of living; a comparative study of workers' living costs in Detroit (U.S.A.) and fourteen European cities. (Series N, No. 17.) Geneva (London: P. S. King), 1931. 9½″ × 6¼″; 210 pp. 7*s.* 6*d.*

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Aftalion (Albert). L'or et sa distribution mondiale. Paris: Librairie Dalloz, 1932. 9″ × 5½″; viii + 235 pp. 25 *fr.*

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—— The structure of a growing population. Reprint from *Human Biology*, Dec., 1931. Baltimore, 1931. 9¾″ × 6″; [35] pp.

Manes (*Alfred*). Versicherungswesen. System der Versicherungswirtschaft. Fünfte Auflage. Zweiter Band—Güterversicherung. xi + 316 pp. *Rm.* 18. Dritter Band—Personenversicherung. ix + 356 pp. *Rm.* 22. Leipzig and Berlin: B. G. Teubner, 1931–32. 9″ × 6″.

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New York State College of Agriculture. Farm economics, No. 74. Feb., 1932. Ithaca, N.Y.: Cornell University, 1932. 9¼″ × 6″.

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[*Pavlovsky* (*George*).] Marketing of agricultural produce. Reprint from *Monthly Bulletin of Agricultural Economics*, Jan., 1932. Rome, 1932. 9½″ × 6¾″; 30 pp. (From the Author.)

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Imports.—*Declared value of merchandise imported into the United Kingdom in the years ended December* 31, **1929, 1930, 1931.**

Countries from which consigned.	1929.	1930.	1931.
	£'000.	£'000.	£'000.
Russia	26,487	34,235	32,179
Finland	14,945	12,634	11,627
Sweden	25,709	22,581	17,347
Norway	14,149	11.967	8,646
Denmark,* including Faroe Islands	56,178	54,118	46,697
Poland, including Dantzig	6,908	7,949	8,613
Germany	68,818	65,490	64,150
Netherlands*	42,372	39,524	35.209
Java	10,196	6,587	4,566
Belgium*	44,019	38,016	33,231
France*	56,549	49,267	40,883
Switzerland	13,741	12,640	11,365
Portugal*	4,216	3,655	3,308
Spain*	19,074	16,638	14,278
Italy*	16,800	15,005	15,149
Czechoslovakia	6,676	6,403	6,611
Greece (excluding Crete)	2,526	2.050	2,022
Roumania	2,965	4,726	3,450
Turkey, European and Asiatic, including Smyrna and Armenia	2,245	1,870	1,486
Egypt	23,583	13,909	10,857
China†	12,157	9,889	7,752
Japan‡	9.132	7,820	7,109
United States	195,980	153,497	104,171
Cuba	7,934	6,874	4,289
Mexico	2,690	2,886	2,399
Peru	6,462	4,494	3,513
Chile	10,615	7,272	4,737
Brazil	7,293	8,111	5,715
Uruguay	5,651	7,387	5,223
Argentine Republic	82,447	56,666	52,764
Other countries	63,406	55,786	45,206
Total—Foreign Countries	861,923	739,946	614,512
BRITISH POSSESSIONS.§			
Irish Free State	45,087	42,955	36,653
British West Africa	11,386	8,159	4,897
Union of South Africa	24,417	20,350	13,143
British East Africa	4,941	4,453	3,684
British India, with Burma	62,845	51,044	36,743
Straits Settlements and Federated Malay States	17,609	11,393	6,457
Ceylon and Dependencies	15,150	13,483	11,995
Australia	55,648	46,449	45,674
New Zealand	47,727	44,899	37,832
Canada	46,410	38,146	32,816
British W. Indies, with Bahamas	5,327	5,134	4.397
Other Possessions	22,292	17,564	11,342
Total—British Possessions	358,842	304,029	247,663
Total—Foreign Countries and British Possessions	1,220,765	1,043,975	862,175

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* Excluding colonies.
† Excluding Hong Kong, Macao and leased territories.
‡ Including Formosa and leased territories.
§ Including Protectorates and Mandated Territories.

Exports: *Declared value of U.K. Produce and Manufactures, and of Imported Merchandise, exported from the United Kingdom in the years ended December* 31, **1929, 1930,** *and* **1931.**

Countries to which consigned.	1929.		1930.		1931.	
	Exports.	Re-exports.	Exports.	Re-exports.	Exports.	Re-exports.
	£'000.	£'000.	£'000.	£'000.	£'000.	£'000.
Russia	3,743	2,798	6,772	2,519	7.121	1,923
Finland	3,363	530	2,414	430	1,602	170
Sweden	10,548	1,156	10,068	868	7,744	721
Norway	9,858	469	12,931	342	7,559	301
Denmark,* with Faroe Islands	10,670	829	10,248	742	8,634	556
Poland, including Dantzig	4,505	779	3,564	616	2,001	574
Germany	36,967	23,253	26,809	17,308	18,413	13,609
Netherlands*	21,818	5,212	18,860	4,149	13,685	3,003
Java	6.642	90	4,510	91	2,507	84
Belgium*	19,413	9,205	15,035	6,544	10,017	4,550
France*	31,663	17,517	29,690	14.508	22,537	9,478
Switzerland	6,424	1,168	5,187	1,096	4,143	854
Portugal*	3,632	358	3,363	428	2,458	206
Spain*	12,055	486	9,334	527	5,294	225
Italy,* including Fiume	16,000	1,579	13,835	957	9,917	728
Czechoslovakia	2,101	136	1,731	116	1,337	128
Greece	4,921	159	3,732	195	3,165	136
Roumania	2,317	58	1,947	39	1,333	29
Turkey, European and Asiatic, incl. Smyrna and Armenia	2,825	121	1,868	73	1,712	66
Egypt	12,576	265	9,808	192	6,650	158
China†	14,029	117	8,574	86	7,859	115
Japan‡	13,435	207	8,229	168	6,166	145
United States	45,558	16,458	28,705	11,229	17,101	8.011
Cuba	2,027	54	1,283	32	656	19
Mexico	2,538	39	2,433	30	943	35
Peru	2,007	86	1,443	56	664	41
Chile	9,196	397	5,963	321	1,932	216
Brazil	13,383	322	7,970	172	4,062	106
Uruguay	3,723	52	3,578	56	1,985	33
Argentine Republic	29,074	603	25,234	442	14,789	271
Other countries	47,887	2,037	37,292	2,024	24,571	1,435
Total—Foreign Countries	404,898	86,640	322,410	66,356	218,557	47,926
BRITISH POSSESSIONS.						
Irish Free State	36,078	10,220	34,497	9,798	30,414	8,575
British West Africa	12,316	1,634	10,730	1,181	6,321	644
Union of South Africa	32,786	1,576	26,661	1,242	21,923	1,075
British East Africa	4,989	133	4,526	111	3,001	84
British India, with Burma	78,227	1,145	52,944	1,283	32,304	802
Straits Settlements and Federated Malay States	15,493	420	10,401	304	6,282	200
Ceylon and Dependencies	5,920	217	3,998	162	2,703	117
Australia	54,235	2,105	31,678	1,391	14,554	626
New Zealand	21,393	793	17,867	762	11,196	535
Canada	35,008	2,503	29,138	2,108	20.560	1,603
Brit. W. Indies, with Bahamas	5,043	311	4,749	297	3,876	300
Other Possessions	22,963	2,005	21,156	1,840	17,473	1,548
Total—British Possessions	324,451	23,062	248,345	20,479	170,607	16,109
Total — Foreign Countries and British Possessions	729,349	109,702	570,755	86,835	389,164	64,035

* Excluding colonies.

† Excluding Hong Kong, Macão, and leased territories; including Weihaiwei as from 1st October, 1930.

‡ Including Formosa and leased territories; excluding Korea.

PERIODICAL RETURNS.

REGISTRATION OF THE UNITED KINGDOM.

No. I.—ENGLAND AND WALES.

BIRTHS, DEATHS AND MARRIAGES—To 31st December, **1931.**

A.—*Serial Table of* Births, Deaths *and* Marriages, *returned in the Years* **1925-1931,** *and in the* Quarters *of those Years.*

Calendar Years, **1925-1931** :—*Numbers.*

Years	**1925.**	**1926.**	**1927.**	**1928.**	**1929.**	**1930.**	**1931.***
Births......No.	710,582	694,563	654,172	660,267	643,673	648,811	632,580
Deaths ... „	472,841	453,804	484,609	460,389	532,492	455,427	491,635
Marriages „	295,689	279,860	308,370	303,228	313,316	315,109	311,402

Quarters *of each Calendar Year,* **1925-1931.**

(I.) Births :—*Numbers.*

Qrs. ended last day of	**1925.**	**1926.**	**1927.**	**1928.**	**1929.**	**1930.**	**1931.***
March......No.	175,523	173,997	166,974	167,926	160,047	158,545	159,820
June ...... „	186,864	181,332	170,778	170,997	169,451	170,042	163,874
September „	181,835	174,837	163,854	165,675	163,777	165,596	161,267
December „	166,360	164,397	152,566	155.669	150,398	154,628	147,619

(II.) Deaths :—*Numbers.*

Qrs. ended last day of	**1925.**	**1926.**	**1927.**	**1928.**	**1929.**	**1930.**	**1931.***
March......No.	138,299	130,611	168,760	136,299	204,309	131,967	162,198
June ...... „	113,218	113,809	107,595	114,742	118,728	111,336	114,700
September „	95,054	90,705	92,238	93,715	96,749	96,389	96,745
December „	126,270	118,679	116,016	115,633	112,706	115,735	117,992

(III.) Marriages :—*Numbers.*

Qrs. ended last day of	**1925.**	**1926.**	**1927.**	**1928.**	**1929.**	**1930.**	**1931.***
March......No.	46,263	46,228	47,940	45,250	54,426	48,825	46,604
June ...... „	81,921	78,393	84,963	84,788	75,488	88,138	85,069
September „	90,314	83,830	91,888	94,478	100,669	98,392	99,372
December „	77,191	71,409	83,579	78,712	82,733	79,754	80,357

* Provisional.

Annual Rates of BIRTHS, DEATHS *and* PERSONS MARRIED, *per* 1,000 PERSONS LIVING *in the Years* **1924–1931**, *and in the* QUARTERS *of those Years.*

Calendar YEARS, **1924-1931** :—*General Ratios.*

YEARS	1924.	1925.	1926.	1927.	1928.	1929.	1930.	1931.*
Estd. Popln. of England and Wales *in thousands* in middle of each Year	38,746,	38,890,	39,067,	39,290,	39,482,	39,607,	39,806,	39,988,*
Births	18·8	18·3	17·8	16·6	16·7	16·3	16·3	15·8
Deaths	12·2	12·2	11·6	12·3	11·7	13·4	11·4	12·3
Persons Married	15·3	15·2	14·3	15·7	15·4	15·8	15·8	15·6

QUARTERS *of each Calendar Year,* **1924-1931.**

(I.) BIRTHS :—*Ratio per* 1,000.

Qrs. ended last day of	1924.	1925.	1926.	1927.	1928.	1929.	1930.	1931.*
March	19·2	18·3	18·1	17·2	17·1	16·4	16·2	16·2
June	19·4	19·3	18·6	17·4	17·4	17·2	17·1	16·4
September ...	19·1	18·6	17·8	16·5	16·7	16·4	16·5	16·0
December ...	17·5	17·0	16·7	15·4	15·7	15·1	15·4	14·6

(II.) DEATHS :—*Ratio per* 1,000.

Qrs. ended last day of	1924.	1925.	1926.	1927.	1928.	1929.	1930.	1931.*
March	16·6	14·4	13·6	17·4	13·9	20·9	13·4	16·5
June	11·8	11·7	11·7	11·0	11·7	12·0	11·2	11·5
September ...	9·2	9·7	9·2	9·3	9·4	9·7	9·6	9·6
December ...	11·1	12·9	12·1	11·7	11·7	11·3	11·5	11·7

(III.) PERSONS MARRIED :—*Ratio per* 1,000.

Qrs. ended last day of	1924.	1925.	1926.	1927.	1928.	1929.	1930.	1931.*
March	9·7	9·6	9·6	9·9	9·2	11·1	9·9	9·5
June	16·8	16·9	16·1	17·3	17·3	15·3	17·8	17·1
September ...	18·4	18·4	17·0	18·6	19·0	20·2	19·6	19·7
December ...	16·0	15·7	14·5	16·9	15·9	16·6	15·9	15·9

* Provisional figures.

B.—*Special Town Table* :—POPULATION; BIRTH-RATE *and* DEATH-RATE (*Civilians*) *in each Quarter of* 1931, *in certain of the* 107 *County Boroughs and Great Towns.*

Cities and boroughs.	Estimated population mid-1931	Annual Rate per 1,000 Living during the thirteen weeks ending							
		April 4, 1931. (1st quarter.)		July 4, 1931. (2nd quarter.)		Oct 3, 1931. (3rd quarter.)		Jan. 2, 1932. (4th quarter.)	
		Births.	Deaths.	Births.	Deaths.	Births.	Deaths.	Births.	Deaths.
107 county boroughs and towns	19,847,160*	16·4	16·9	16·8	11·1	16·1	9·3	14·8	12·1
Including—									
London (Met. Bs.)	4,374,300*	15·2	16·7	15·6	10·7	15·1	9·1	14·0	12·2
West Ham C.B.	296,700	17·0	15·8	18·9	9·8	17·9	8·4	16·3	12·0
Croydon C.B. ...	233,800	14·7	16·9	15·3	9·9	15·5	7·6	13·4	11·5
Brighton C.B. ...	145,000*	13·3	17·8	14·8	12·5	13·0	10·6	12·8	12·4
Portsmouth C.B.	248,400*	15·3	16·4	19·5	11·7	17·8	9·8	16·5	11·5
Bristol C.B.	399,900*	15·2	16·8	15·9	10·3	15·5	8·9	14·3	11·3
Cardiff C.B.	223,800*	16·8	16·0	17·8	11·7	17·2	10·2	15·5	12·5
Swansea C.B.......	165,500	16·7	14·9	16·7	11·1	16·5	8·9	17·3	10·3
Wolverh'ton C.B.	134,400	16·1	16·0	19·0	10·0	17·5	9·3	15·6	11·3
Birmingham C.B.	1,012,700	17·9	16·3	18·0	10·8	17·4	8·5	15·9	11·0
Norwich C.B.......	126,800*	15·3	16.9	15·2	10·4	16·6	9·4	14·5	11·2
Leicester C.B.......	241,300	15·8	16·3	15·5	11·4	15·7	9·3	13·8	11·5
Nottingham C.B.	270,900	18·4	18·3	18·0	12·1	16·8	10·0	15·6	12·9
Derby C.B.	143,600*	17·4	15·9	16·4	8·7	15·8	9·0	14·9	11·1
Birkenhead C.B.	148,500	17·4	16·5	20·4	11·6	18·2	8·5	16·6	12·9
Liverpool C.B. ...	862,900	21·6	19·7	22·9	12·2	21·9	10·0	19·9	14·0
Bolton C.B.	179,200	13·8	18·0	13·7	11·3	14·7	9·8	12·8	13·8
Manchester C.B.	773,900	17·4	19·5	17·0	11·4	16·0	9·9	14·1	13·7
Salford C.B.	225,900	15·7	19·4	17·4	11·6	16·0	9·5	14·5	12·7
Oldham C.B.	141,900	14·7	19·7	13·9	11·9	13·0	10·1	13·1	14·0
Burnley C.B.	99,180	13·5	18·2	13·5	13·9	13·5	9·9	11·6	13·3
Blackburn C.B....	123,900	11·9	18·3	13·9	13·7	12·3	10·1	11·5	13·2
Preston C.B.	120,100	15·9	18·7	16·2	11·4	16·5	10·4	13·3	13·2
Huddersfield C.B.	114,300	12·2	17·5	12·1	12·6	12·6	11·5	12·1	12·6
Halifax C.B.	98,750*	12·7	19·3	13·7	12·7	12·8	10·4	11·7	16·5
Bradford C.B. ...	300,900	14·7	18·5	14·8	13·2	13·1	11·3	11·8	13·4
Leeds C.B.........	486,400	15·5	17·4	16·3	12·7	14·7	10·3	13·2	12·6
Sheffield C.B. ...	517,300	15·5	14·5	15·7	10·8	14·7	8·8	13·9	9·8
Kingston - upon - Hull C.B.	315,200	20·0	19·4	19·6	10·8	19·4	10·0	17·5	13·0
Sunderland C.B.	187,600	24·0	19·7	22·7	14·0	21·1	10·2	19·9	12·9
Gateshead C.B. ...	123,700	21·4	18·6	20·6	12·3	20·1	9·7	18·5	13·6
Newcastle-on-Tyne C.B.	284,400*	18·5	17·8	18·6	12·2	17·2	10·2	17·0	12·5

* Excluding non-civilians.

Note.—The 107 great towns are those with populations exceeding 50,000 persons at the Census of 1921; before the second quarter of 1927 the figures referred to 105 towns only.

No. II.—SCOTLAND.

BIRTHS, DEATHS AND MARRIAGES IN THE YEAR ENDED DECEMBER 31, 1931.

I.—*Serial Table:—Number of* BIRTHS, DEATHS *and* MARRIAGES *in Scotland, and their Proportion to the Population estimated to the Middle of each Year, during each Quarter of the Years* 1927–1931 *inclusive.*

	1927.		1928.		1929.		1930.		1931.	
	Number.	Per 1,000.	Number.	Per 1,000.	Number	Per 1,000.	Number.	Per 1,000.	Number.	Per 1,000.
1st quarter—										
Births	24,775	20·7	24,252	20·1	23,449	19·6	23,686	19·8	23,558	19·7
Deaths ...	19,437	16·2	19,387	16·1	26,386	22·1	19,055	15·9	20,189	16·9
Marriages	7,348	6·1	7,383	6·1	6,727	5·6	7,303	6·1	7,068	5·9
2nd quarter—										
Births	25,116	20 7	25,723	21·3	24,380	20·2	24,822	20·5	24,122	20·0
Deaths ...	15,812	13·1	16,567	13·6	15,895	13·1	15,889	13·2	15,919	13·2
Marriages	7,931	6·5	7,905	6·6	8,117	6·7	8,292	6·9	8,158	6·8
3rd quarter—										
Births	23,496	19·2	23,444	19·2	23,053	18·9	22,954	18·8	22,659	18·6
Deaths ...	13,641	11·1	13,458	11·1	13,283	10·9	13,356	10·9	13,242	10·8
Marriages	9,093	7·4	9,236	7·6	9,686	7·9	9,537	7·8	9,351	7·7
4th quarter—										
Births	23,285	19·0	23,403	19·2	21.998	18·0	23,087	18·9	21,870	17·9
Deaths ...	16,940	13·8	15,859	13·0	15,353	12·6	15,985	13·1	14,880	12·2
Marriages	8,181	6·7	8,424	6·9	8,437	6·9	8,211	6·7	8,090	6 6
Year—										
Population	4,858,089		4,854,021		4,849,953		4,845,886		4,842,554	
Births	96,672	19·9	96,822	19·9	92,880	19·2	94,549	19·5	92,209	19·0
Deaths	65,830	13·6	65,271	13·4	70,917	14·6	64,285	13·3	64,230	13·3
Marriages ...	32,553	6·7	32,948	6·8	32,967	6·8	33,343	6·9	32,667	6·7

II.—*Number of Births, Deaths, and Marriages in the* 263 *Large Burghs and Other Districts of SCOTLAND and their proportion to the population during each quarter of* **1931.**

	Births.		Deaths.		Marriages.	
	Number.	Annual rate per 1,000 persons.	Number.	Annual rate per 1,000 persons.	Number.	Annual rate per 1,000 persons.
1st quarter—						
Large Burghs	13,443	20·7	11,207	17·3	4,401	6·8
including Glasgow ...	5,883	21·9	4,874	18·2	1,950	7·3
including Edinburgh ...	1,752	16·2	1,830	16·9	749	6·9
including Dundee ...	890	20·6	755	17·4	294	6·8
Other Districts	10,115	18·6	8,982	16·5	2,667	4·9
2nd quarter—						
Large Burghs	13,855	21·1	8,725	13·3	5,181	7·9
including Glasgow ...	5,995	22·1	3,765	13·9	2,329	8·6
including Edinburgh ...	1,995	17·9	1,389	12·7	934	8·5
including Dundee ...	929	21·2	643	14·7	292	6·7
Other Districts	10,267	18·6	7,193	13·0	2,977	5·4
3rd quarter—						
Large Burghs	12,715	19·2	7,235	10·9	6,339	9·6
including Glasgow ...	5,526	20·1	3,048	11·1	2,761	10·1
including Edinburgh ...	1,746	15·8	1,189	10·7	1,215	11·0
including Dundee ...	834	18·8	473	10·7	420	9·5
Other Districts	9,944	17·8	6,007	10·8	3,012	5·4
4th quarter—						
Large Burghs	12,490	18·8	8,526	12·9	5,034	7·6
including Glasgow ...	5,527	20·1	3,814	13·9	2,223	8·1
including Edinburgh ...	1,710	15·5	1,318	11·9	890	8·0
including Dundee ...	778	17·6	574	13·0	262	5·9
Other Districts	9,380	16·8	6,354	11·4	3,056	5·5

No. III.—NORTHERN IRELAND.

NORTHERN IRELAND.—*Number of Births, Deaths and Marriages for each Quarter of* 1931 *and their Proportion to the Population.*

	Births.		Deaths.		Marriages.	
	Number.	Annual rate per 1,000 of population.	Number.	Annual rate per 1,000 of population.	Number.	Annual rate per 1,000 of population.
1st quarter	6,427	20·6	5,814	18·7	1,412	4·5
2nd „	7,005	22·5	4,502	14·5	1,905	6·1
3rd „	6,456	20·7	3,736	12·0	2,139	6·9
4th „	5,857	18·8	4,024	12·9	1,904	6·1
Total for year 1931	25,745	20·7	18,076	14·5	7,360	5·9

Population of Northern Ireland, estimated provisionally to mid 1931 (inclusive of military) :—1,246,000.

	Births.		Deaths.		Marriages	
	Number.	Annual rate per 1,000 persons.	Number.	Annual rate per 1,000 persons.	Number.	Annual rate per 1,000 persons.
1st quarter—					Details not available.	
Total rural districts	2,866	18·6	2,809	18 2		
Total co. boroughs and urban dists.	3,561	22·3	3,005	18·8		
Belfast C.B. ...	2,336	22 6	*2,034	19·7		
Londonderry C.B.	295	26·2	218	19·4		
2nd quarter—						
Total rural districts	3,093	20·0	2,381	15 4		
Total co. boroughs and urban dists.	3,912	24·5	2,121	13·3		
Belfast C.B. ...	2,639	25·5	*1,426	13·8		
Londonderry C.B.	263	23·4	145	12·9		
3rd quarter—						
Total rural districts	2,857	18·5	1,936	12·5		
Total co. boroughs and urban dists.	3,599	22·5	1,800	11·3		
Belfast C.B. ...	2,370	22·9	*1,135	11·0		
Londonderry C.B.	290	25·8	137	12·2		
4th quarter—						
Total rural districts	2,563	16·6	2,099	13·6		
Total co. boroughs and urban dists.	3,294	20 6	1,925	12·0		
Belfast C.B. ...	2,125	20·5	*1,262	12·2		
Londonderry C.B.	282	25·0	142	12·6		

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* Including deaths of persons admitted from Belfast into institutions outside the co. borough, numbering 76, 49, 49 and 41 in the respective quarters.

No. IV.—IRISH FREE STATE.

Number of Births, Deaths and Marriages in the Irish Free State for each quarter of the year 1931, *and their proportion to the population.*

	Births.		Deaths.		Marriages.	
	Number.	Annual rate per 1,000 of population.	Number.	Annual rate per 1,000 of population.	Number.	Annual rate per 1,000 of population.
1st quarter	14,301	19·3	13,680	18·5	3,494	4·7
2nd ,, ...	15,175	20·5	11,284	15·3	3,214	4·3
3rd ,, ...	14,405	19·5	8,373	11·3	3,565	4·8
4th ,, ...	13,222	17·9	9,620	13·0	2,963	4·0
Total for year 1931	57,103	19·3	42,957	14·5	13,236	4·5

Population of the Free State estimated to mid 1931 :—2,957,000.

1931.	Births.		Deaths.		Marriages.	
	Number.	Annual rate per 1,000 persons.	Number.	Annual rate per 1,000 persons.	Number.	Annual rate per 1,000 persons.
1st quarter—					Details not available.	
Total rural districts	9,177	17·7	9,041	17·5		
Total urban ,,	5,124	23·2	4,639	21 0		
Dublin City ...	2,601	25·2	2,288	22·2		
Cork Co. Borough	447	22·8	437	22·3		
2nd quarter—						
Total rural districts	9,699	18·7	7,862	15·2		
Total urban ,,	5,476	24·8	3,422	15·5		
Dublin City ...	2,782	27·0	1,614	15·7		
Cork Co. Borough	520	26·5	330	16·8		
3rd quarter—						
Total rural districts	9,037	17·4	5,829	11·2		
Total urban ,,	5,368	24·3	2,544	11·5		
Dublin City ...	2,733	26·5	1,166	11·3		
Cork Co. Borough	474	24·2	239	12·2		
4th quarter—						
Total rural districts	8,586	16·6	6,520	12·6		
Total urban ,,	4,636	21·0	3,100	14·0		
Dublin City ...	2,309	22·4	1,494	14·5		
Cork Co. Borough	415	21·1	269	13 7		

No. V.—GREAT BRITAIN AND IRELAND.

SUMMARY *of* BIRTHS, DEATHS *and* MARRIAGES, *in the Year* **1931.**

(Compiled from the Quarterly Returns of the respective Registrars-General.)

Countries.	[000's omitted.] Area in statute acres.	[000's omitted.] Population middle 1931, estimated.	Births.	Per 1,000 of population.	Deaths.	Per 1,000 of population.	Marriages.	Per 1,000 of population.
		No.	No.	Ratio.	No.	Ratio.	No.	Ratio.
England and Wales ...	37,340	39,988	632,580	15·8	491,635	12·3	311,402	7·8
Scotland ...	19,462	4,843	92,209	19·0	64,230	13 3	32,667	6·7
Northern Ireland ...	3,488	1,246	25,745	20·7	18,076	14·5	7,360	5·9
GreatBritain and Northern Ireland	60,290	46,077	750,534	16·3	573,941	12·5	351,429	7·6
Irish Free State ...	17,254	2,957	57,103	19·3	42,957	14·5	13,236	4·5

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LANCASHIRE AND THE INDIAN MARKET.

By A. R. BURNETT-HURST, M.Sc. (Econ.).

[Read before the ROYAL STATISTICAL SOCIETY, March 15, 1932, the President, Sir J. C. STAMP, G.B.E., LL.D., D.Sc., in the Chair.]

THE depression which has prevailed in the Lancashire cotton industry since 1920 has been the subject of many studies. These, for the most part, have been concerned with the internal condition of the industry; the incidence of the depression, unemployment, financial reconstruction, etc. A general Survey of Textile Industries * and a special study of "Japanese Competition in the Cotton Trade" † have been made; but no detailed investigation into the effects of recent changes in the economic and political conditions in India upon the Lancashire cotton industry has yet been published. This is the more surprising when it is remembered that India has been since the middle of the nineteenth century to the present day Britain's best customer for cotton piece goods, the most important branch of the export trade.

The aim of this paper is to survey the trade in yarn and piece goods immediately before, during, and after the war, with special reference to the post-war period. I propose to describe some of the chief factors which have influenced, adversely or favourably, the course of trade, and to attempt to assess upon other than statistical grounds the relative importance of each.

I will preface the survey by drawing attention to the need for exercising caution in handling textile statistics, especially those relating to India.

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* Committee on Industry and Trade. Part III of a Survey of Industries. 1928.

† A paper read by B. and H. Ellinger before the Royal Statistical Society on January 21, 1930.

The more important shortcomings and defects in the material available for analysis are set out below :—

(*a*) Mr. A. W. Flux * has drawn attention to the wrong conclusions that may be formed in comparing merely quantitative statistics. The yardage of piece goods imported at two dates may differ but little, yet there may be great differences in the quality of the texture. In India the statistics of both production and imports of yarn are recorded according to the counts, but there is no exact method of measuring qualitative difference in piece goods.

(*b*) In India the statistics of the production, import and export of piece goods are classified differently. Imported piece goods are classified in the Annual Statement of Sea-Borne Trade under more than one hundred heads, whilst the output of Indian mills is returned under fifteen classes in the Monthly Statistics of Cotton Spinning and Weaving in India. The same name or term may have a very different significance in the two sets of figures. Comparisons, therefore, between the production and import of goods bearing the same name should be made with particular caution.

(*c*) From 1899–1900 to 1918–19 piece goods were classified under three main heads, grey (unbleached), white (bleached) and coloured, with sub-heads for special weaves and for garment-lengths, not strictly piece goods. The basis of the sub-classification was the fineness of yarn from which the goods were woven and the weight of the cloth. In 1918–19 a number of changes were introduced. It is not possible to detail these changes here, but one or two examples should suffice to indicate the character of the re-classification. Grey goods of all kinds have been sub-divided into "plain" and "bordered." Coloured goods are now recorded under three heads, "Printed," "Dyed" (in the piece) and "Woven" (from dyed yarns).

More difficult to detect are the slight changes in the methods of classification which are made from time to time. For example, it would appear that the British share of the trade in bleached goods declined from 95 per cent. in 1926–27 to 92 per cent. in 1927–28, while the Continent and Japan improved their position. The fact is that white yarn dhutis from Lancashire were transferred in the statistics from the "white" to the "grey" sub-head.

(*d*) The *quantity* (both weight and linear yardage) but not the *value* of the production of Indian mills is published. Grey and bleached goods are not shown separately; they are classified under ten main heads. Coloured goods are not subdivided.

(*e*) Similarly, statistics of the value of yarn produced are not available.

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* *Economic Journal*, December, 1926.

(*f*) No statistics are available for the production of hand-woven yarn and hand-woven cloth.

Section I.—*Trade before the War.*

A brief account of the conditions prevailing in the years immediately preceding the war is necessary to a proper understanding of the vast changes which have taken place in the trade in cotton yarn and manufactures with India during the past twenty years.

India was the largest consumer of cotton goods in the world. Part of her needs were met by the products of the village handlooms, for, as now, nearly every village boasted a weaver, while in several towns and large villages a considerable industry was conducted.* Part again of India's needs were met by the output of the cotton mills situated in Bombay, Ahmedabad, Cawnpore, and other cities and towns. The remarkable growth of the mill industry (*vide* Appendix I, Table A) has been one of the features of India's great economic development. The first mills were started in the middle of the nineteenth century, but it was not until the 'eighties that the industry made rapid progress. By 1914, when about 6½ million spindles and 100,000 looms were in operation, India ranked fourth among the cotton manufacturing countries of the world.

Yarn Trade. India produced not only the bulk of the yarns which she consumed, but also exported a quantity far in excess of her imports of yarn. The Indian mills were supreme in counts

TABLE I.

India: Quantity of yarn produced by Mills and imported, 1913–14.

(Million lb.)

	Counts.				Unspecified, Wastes, etc.	Total Yarn.
	1 to 20.	21 to 30.	31 to 40.	Above 40.		
Indian Mill Production	493	167	20	3	—	683
Imports from:						
United Kingdom	1	4	19	8	6	38
Japan	—	—	—	—	1	1
Other Countries	—	1	4	—	—	5
Total Supplies	494	172	43	11	7	727

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* The handloom industry is in much the same condition to-day. For the most part, the products are the coarsest cloths although certain centres specialize in weaving fine cloths of beautiful design.

below 30's and they supplied nearly half the requirements of their home market in counts 31's to 40's.

The imports were obtained almost entirely from the United Kingdom. British yarns formed more than four-fifths in weight of the total import and exactly one-half of the yarns from the United Kingdom were counts 31's to 40's. Any developments of finer spinning by the Indian mills, therefore, were bound to intensify the competition in these grades and even in the counts above 40's. Consignments from Japan were comparatively insignificant.

Piece Goods Trade. The production of cloth in India and its relation to the import and export trade in 1913–14 is shown in the following statement :—

Indian Mill Production	1,164	million	yards.
Imports	3,197	,,	,,
Production and Imports	4,361	,,	,,
Exports	89	,,	,,
Re-exports	62	,,	,,
	151		
Balance available for Consumption	4,210		

In addition a rough estimate of the handloom production placed it at about 1,000 million yards. Even if the products of the handloom are included, India depended for three-fifths of her requirements of cotton cloth upon imports. No less than 97 per cent. of these imports were obtained from the United Kingdom. Lancashire supplied nearly 99 per cent. of the imports of grey goods, the only competition being American drills and jeans. The United Kingdom held almost the same share of the trade in bleached goods; the only other country of importance in the market was the Netherlands with supplies of white shirtings noted for their excellent bleach and finish. There was slightly more competition in the coloured trade, but even here the United Kingdom was responsible for over 92 per cent. of the imports, the balance being largely special types of coloured goods from Italy and bright woven *loongis* from the Netherlands.

India was, in fact, Britain's best customer. In 1913, out of a total of 7,000 million yards valued at nearly £100 million, India's share was not less than 3,000 million yards, valued at £35 million. The importance of the Indian market in the different branches of the piece goods trade is shown in the following table :—

TABLE II.

United Kingdom : Exports of Cotton Piece Goods, 1913.

Countries to which consigned	Quantity. (Million yards)						Value (Million £.)					
	Grey.	Bleached.	Printed.	Dyed.	Coloured.	Total.	Grey.	Bleached.	Printed.	Dyed.	Coloured.	Total.
British India	1,483	782	470	286	36	3,057	15·9	9·0	5·9	3·7	0·6	35·0
All Countries	2,358	2,045	1,231	1,151	290	7,075	27·4	27·1	16·7	21·8	4·8	97·8
Percentage exported to British India	63%	38%	38%	25%	12%	43%	58%	33%	35%	17%	12%	36%

Section II.—*War Period* (1914–15 *to* 1918–19).

The marked expansion in Indian trade during the quinquennium preceding the outbreak of war resulted in the imports of cotton manufactures for the year 1913–14 reaching Rs. 66 crores or £44 million, the highest point in the history of the trade. Early in 1914, however, trade began to contract owing to various causes. Overproduction had led to a glut in the piece goods market, while the partial failure of crops and tightness of money through bank failures had aggravated the situation. The reaction which had already set in was accentuated by the outbreak of war. Imports from Germany, Austria-Hungary and Belgium ceased almost immediately, while trade with the Netherlands and Italy was restricted. Even supplies from the United Kingdom were soon affected. The scarcity of labour in Lancashire consequent upon the gradual enlistment of operatives together with the shortage of transport facilities and increased freight charges resulted in rising costs of production. At the same time there was a shrinkage of demand from India since the loss of important foreign markets, especially of Germany, and the curtailment of trade with other countries had created distress among the peasantry and reduced its purchasing power. For a few months Lancashire retained her hold on the market, but her competitors, especially Japan and the United States, were alive to the opportunity which the rising costs of production in Lancashire created. Soon Japanese and American agents arrived in India to make a close study of the market and its requirements. Japanese mercantile houses—the Nippon Menkwa Kabushiki Kaisha (Japan Cotton Trading Co., Ltd.) and the Toyo Menkwa Kabushiki Kaisha (Oriental Cotton Trading Co., Ltd., an affiliation of the Mitsui firm)—opened branches in Bombay and a large number of agencies and subagencies throughout India. These firms also acquired and operated ginneries and presses. The Yokohama Specie Bank and other

Japanese banks extended the fullest facilities for financing the trade with India, while Japanese shipping lines * established regular and direct services between India and Japan. There is no doubt that the immediate success achieved by Japan in the Indian market was due largely to the rapidity with which she secured her position by the effective co-operation of her various commercial interests. Other factors which are stated to have contributed materially to this result were "a disposition to cater to the demands of the people, a policy of selling goods at little or no margin of profit in order to secure an established position in the trade, and good and comparatively cheap transportation facilities." † It must be remembered also that at the time many Japanese cotton mills were working double-shifts of eleven and twelve hours each and they continued to do so until 1926. Further, the wage and salary bills of Japanese manufacturers and mercantile houses were, owing to the relatively low standard of living of their employees, considerably less than those of their European competitors.

Yarn Trade. The import trade in yarn consisted roughly of two-thirds undyed yarn and one-third dyed yarn. Almost the entire supply was yarn of counts 25's and upwards, more than half the imports being of counts from 31's to 40's. During the first two years of the war there was little change in the total volume of trade or in the share taken by the principal countries. The United Kingdom supplied nearly nine-tenths of the yarn imported. The other sources of supply, mostly dyed yarn, were Holland (5 per cent. in 1914–15 falling to 2 per cent. in 1915–16), Japan (2 per cent.), Italy (2 per cent. falling to 1½ per cent.) and Switzerland (nearly 2 per cent.). Indian mill production rose from 650 million lb. in 1914–15 to 722 million lb. in 1915–16, the increase being confined to the spinning of a greater quantity of coarse yarn. During the next three years (*i.e.* 1916–17 to 1918–19), although the output of the Indian mills declined, the production of fine yarns, particularly counts above 40's, rose considerably. The increase in the spinning of higher counts was attributed partly to "the demands of the handloom weavers of finer products which importers were for a variety of reasons unable to satisfy." ‡ The import trade had declined as the war advanced and supplies of yarn in 1917–18 fell to half the quantity imported in 1915–16. Shipments from the United Kingdom became more difficult as the producing capacity of that country was increasingly directed to meet war requirements. The effects of the intensive submarine campaign were also severely felt. Imports from the

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* Nippon Yushen Kaisha and the Osaka Shosen Kaisha.

† Report of the Commercial Agent, U.S. Department of Commerce, 1917.

‡ *Handbook of Commercial Information for India*, by C. W. E. Cotton, I.C.S., 1919.

United Kingdom fell from 37 million lb. in 1915–16 to 9½ million lb. in 1918–19, and Britain's share of the import trade declined from 91 per cent. to 25 per cent. during the same period. Japan increased her shipments of yarn, chiefly of counts Nos. 31's to 40's (at first; but subsequently 50's and over) and mercerised cotton yarn. Imports from Japan rose from 700,000 lb. in 1915–16 to over 27 million lb. in three years, while her share of the trade increased from 1·7 per cent. to 72 per cent. The increase in the imports of Japanese yarn was especially marked in counts 31's to 40's and 16's to 20's. It is interesting to compare the relative position of the United Kingdom in the imported yarn trade before and during the war.

TABLE III.

India: Quantity of Cotton Twist and Yarn imported, distinguishing the Principal Countries of Consignment.

(Thousand lb.)

Countries whence Consigned.	Pre-War Average. 1909–10 to 1913–14.		1913–14.		1914–15.		1915–16.		1916–17.		1917–18.		1918–19.	
	Quantity.	Per cent of Total Imports	Quantity.	Per cent. of Total Imports.	Quantity.	Per cent. of Total Imports.	Quantity.	Per cent of Total Imports.	Quantity.	Per cent. of Total Imports.	Quantity.	Per cent. of Total Imports.	Quantity.	Per cent. of Total Imports.
Imports from:														
United Kingdom	37,050	89	37,836	86	37,395	87	36,941	91	24,476	83	14,947	77	9,612	25
Japan .	458	1	1,000	2	922	2	702	2	4,008	14	4,206	22	27,280	72
All Countries	41,794	100	44,171	100	42,864	100	40,427	100	29,530	100	19,400	100	38,095	100

Piece Goods Trade. At the outbreak of hostilities, stocks in the piece goods market were still heavy as a result of over-trading in the preceding two years. The war did not improve conditions; the glut was even intensified. The uncertainty of the market, together with the reduced purchasing power of consumers, combined to restrain buyers from making further purchases. Imports of the various classes of piece goods, viz. grey, white and coloured goods, consequently showed an all-round decline. The piece goods trade in 1913–14 was roughly apportioned in volume among the three classes as follows: greys, one-half; white, one-quarter; and coloured, one-quarter. The United Kingdom dominated all the branches of the trade, supplying nearly 99 per cent. of greys, 98½ per cent. of whites and 92½ per cent. of coloured. The effects of the war were most marked in the case of the coloured goods, for Lancashire was heavily handicapped by the shortage of dyes. Further, Britain's chief competitors in the piece goods trade, apart from Japan, were Holland, Italy, Germany, Belgium and Austria-Hungary, and shipments from these countries consisted almost entirely of coloured goods. A feature, therefore, of the first two years of the war was a considerable decrease both in the quantity and value of coloured goods consigned to India. Imports declined from 832 million yards valued at nearly £12 million in 1913–14 to 359 million yards valued at £5·7 million in 1915–16. Greys and whites also showed a decrease, but not to such a marked extent as did coloured goods. Japan saw her opportunity and took advantage of it by immediately increasing shipments of grey goods, especially shirtings and drills. The Indian mills also increased their production of piece goods, even coloured goods, despite the problem of obtaining chemicals and dyes which had hitherto been imported from Germany. Meanwhile, "there was no appreciable increase in the prices of white or grey goods, but coloured goods were marketed at enhanced values owing to the higher prices of dyes required for manufacture." During 1916–17 increased supplies of coloured goods came from both the United Kingdom and Japan, but imports of grey and bleached goods continued to decline. The improvement in shipments of coloured goods was only temporary. Further decreases in imports under each of the three heads took place in the next two years, as will be seen from the following statement:—

TABLE IV.

India: Imports of Cotton Piece Goods during the War.

Year.	Quantity. (Million yards)			Value. (Million £.)		
	Grey.	White.	Coloured, Printed or Dyed.	Grey.	White.	Coloured, Printed or Dyed.
Pre-War Average ...	1,331	654	632	14·1	7·5	8·6
1913–14	1,534	793	832	17·0	9·5	11·9
1914–15	1,320	604	495	14·2	7·2	7·0
1915–16	1,148	611	359	12·1	7·1	5·7
1916–17	847	590	455	11·2	8·5	10·1
1917–18	626	502	396	12·3	9·5	10·8
1918–19	584	287	227	15·7	8·8	7·9

From Appendix I, Tables E to G, it will be seen that the most important varieties of imported piece goods decreased considerably. The most marked decreases were in white nainsooks and coloured shirtings.

The scarcity of shipping and the curtailment of home production compelled Lancashire to relax her hold of the market. Her share of the import trade declined from 97 per cent. pre-war to 77 per cent. in 1918–19, while that of Japan increased from ·1 per cent. to 21 per cent. The United Kingdom lost most ground in grey goods, and it was here that Japan made remarkable progress. Imports of grey longcloth and shirtings from Japan increased from 5 million yards in 1913–14 to 131 million yards in 1918–19, and sheetings from a few thousand yards to over 50 million yards.

TABLE V.

India: Quantity of Piece Goods imported from the United Kingdom and Japan, Pre-War and 1918–19.

Million yards.

	Pre-War Average 1909–10 to 1913–14						1918–19.					
	Grey.		White.		Coloured		Grey.		White.		Coloured.	
	Quantity	Per cent. of Imports.	Quantity.	Per cent. of Imports.	Quantity.	Per cent. of Imports.	Quantity.	Per cent. of Imports.	Quantity.	Per cent of Imports.	Quantity.	Per cent of Imports.
United Kingdom	1,316	98 9	643	98 3	590	93·5	375	64 3	274	95 9	201	88 5
Japan ...	3	0 2	—	—	1	0·1	207	35 4	10·5	3 7	21	9 1
Total Imports	1,351	100 0	654	100 0	632	100·0	583	100·0	287	100·0	227	100 0

Indian Mill Production. At the outbreak of the war, the spinning and weaving industries in India were in the throes of a depression. Stocks had accumulated; several mills were working short time, whilst others had closed down temporarily. The war created fresh difficulties. There was a shortage of the cheap, fast dyes imported from Germany. It was difficult to obtain supplies of chemicals and stores. Further, spinners were anxious about exports. Normally, about 30 per cent. of the output of Indian yarn was exported, chiefly to Hong-Kong and China. The fall of yarn prices in China during 1914, together with the loss of Asiatic Turkey as a market for Indian yarn, resulted in smaller demands and decreased exports. Moreover, there was a decline in the exports of piece goods. The set-back to the Indian mill industry, however, proved short-lived. The heavy drop in imports enabled the mills to recover lost ground and to resume the remarkable progress which they had made until 1913. The decrease in imports of coloured and bleached piece goods, together with the demand from markets (for example, Persia and Africa) formerly supplied by continental countries, resulted in increased activity in 1915–16. Exports for 1916–17 exceeded previous records and production reached its highest level in the following year. The large profits earned by the mills enabled many of them to strengthen their financial position. A slight reaction, however, set in at the close of the war. The difficulties of renewing worn-out plant, erecting new mills and installing new machines began seriously to be felt. Moreover, Japanese competition had become more formidable both in the Indian market and abroad. In China, the principal market for Indian twist, cheap Japanese yarns were ousting the Indian products, while the high rates prevailing for raw cotton in India in 1918–19 so enhanced the price of yarn as to encourage unprecedented shipments of Japanese and Chinese yarns to Bombay. Nevertheless, the tide had definitely turned in favour of the Indian industry. The way was prepared for a period of great prosperity upon the termination of hostilities. The progress of the Indian mills during the war is shown in the following table summarizing the position of the yarn and piece goods trade.

TABLE VI.

India: Production and Trade in Yarn and Piece Goods, Pre-War and War.

	Pre-War Average 1909–10 to 1913–14.	1914–15.	1915–16.	1916–17.	1917–18.	1918–19.
	Million lb.					
Yarn:						
Indian Mill Production ...	647	652	722	681	661	615
Imports	42	43	40	30	19	38
	689	695	762	711	680	653
Exports (including Re-exports)	193	134	160	169	122	64
Net quantity available in India	496	561	602	542	558	589
	Million yards.					
Piece Goods:						
Indian Mill Production ...	1,105	1,136	1,442	1,578	1,614	1,451
Imports	2,632	2,446	2,148	1,934	1,556	1,122
	3,737	3,582	3,590	3,512	3,170	2,573
Exports	90	67	113	264	189	149

Section III.—*Trade since the War.*

Since an economic and political background is necessary to a full appreciation of the changes that have taken place in the Indian cotton trade during the post-war years, a chronicle of the important events of each year has been compiled and is given in Appendix IV. It is not to be assumed that this chronicle is either exhaustive or complete. It has been inserted for general reference purposes for the benefit of those who are not conversant with the economic and political situation of the country in recent years; and for this reason it is not proposed to review the events in detail here. It will be of value, however, to consider some of the main factors which have influenced the course of the cotton trade since the war. They comprise :—

(*a*) the purchasing power of the Indian cultivator,
(*b*) exchange ratios,
(*c*) political agitation and the boycott of British goods,
(*d*) fiscal changes.

This list could easily be extended to include labour troubles in Bombay and Lancashire, events in Japan such as the earthquake in September, 1923, and the financial crisis in the spring of 1927, the embargo placed by the Marwari Chamber of Commerce, Calcutta, upon imports of piece goods in certain months of 1929 and 1930, etc., but it will suffice to make references to the effects of these factors when the fluctuations of trade are analysed.

(a) *The Purchasing Power of the Indian Cultivator.* The basic factor determining the demand for cotton goods in India is the purchasing power of the masses. The country is predominantly agricultural and nearly three-quarters of the people depend for their livelihood upon the soil. The economic life of the country, therefore, is profoundly affected by the character of the monsoon. A plentiful and well-distributed rain supply with good harvests generally means prosperity for the *ryot* (cultivator), while scarcity or maldistribution may result in famine and poverty. Under normal conditions, therefore, the prosperity of the masses varies with the character of the monsoon. The aftermath of the war, however, at times created abnormal conditions which reduced the purchasing power of the peoples. For example, in 1923, even after three favourable monsoons and good harvests had brought prosperity to the cultivators, prices of imported articles, including cotton piece goods, were so high as to place them beyond the reach of the consumer.* The average ryot was compelled by the high level of prices of piece goods either to abstain from purchases or to buy more sparingly; or at least to substitute cheaper goods. Many consumers, on the ground of economy, substituted "greys" for the more expensive coloured, printed, dyed, and bleached goods. Others purchased Japanese and Indian-mill fabrics in place of British goods. Many hundreds of thousands of households, however, made no purchases at all.

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* "In trying to interpret a lack of expansion of imports, *e.g.* of Manchester piece goods, in response to the increased purchasing power resulting from expanded exports, it has to be borne in mind that the Indian cultivator is paying about 170 per cent. more than before the war for his piece goods, while he is receiving only about 30 to 40 per cent. more than before the war for his agricultural produce." Review of the Trade of India in 1923–24.

Another and more recent example may be cited. The precipitate fall in world prices which began in October, 1929, was more marked in the case of raw materials and agricultural products than in the case of manufactured articles. The following table shows clearly that this was the case in India :—

TABLE VII.

Calcutta : Index-Numbers of Wholesale Prices of Staple Articles of Export and Import.

	Index-Numbers (July 1911 = 100).		
	September, 1929.	March, 1931.	Percentage Decline.
Exported Articles :			
Cereals : Rice	124	81	35
Wheat	135	72	47
Tea	129	114	12
Oil-seeds	175	90	49
Jute, raw	90	45	50
Cotton, raw	146	93	36
Hides and skins	109	80	27
Jute Manufactures ...	122	80	34
Imported Articles :			
Cotton Manufactures ...	161	130	19
Metals	130	110	15
Sugar	164	133	19

The ryot in consequence received for his cereals, cotton, jute, hides, etc., prices very considerably below pre-war rates; while the prices of cotton manufactures stood at 30 per cent. *above* the pre-war level. Further, the fixed charges which he had to meet, *e.g.* rent, interest charges to the village money-lender (*bunnia*), etc., remained the same, in spite of the diminution of his income. It is obvious that the Indian ryot cannot afford to buy piece goods on the normal scale when his purchasing power has diminished. Whenever, therefore, the return which the cultivator receives from the sale of his crops is insufficient to meet his fixed cash payments and to provide him with a surplus available for the purchase of cotton cloth, the imports of piece goods from the United Kingdom, Japan or any other country are likely to decline.

(b) *Exchange Ratios.* Reference will only be made to two outstanding events which have affected the course of trade :—

(i) The abnormal rise in the sterling exchange rate during the fiscal year 1919–20 synchronized with an unprecedented rise in the price of silver. The rate of exchange for demand bills rose rapidly from 1*s*. $6\frac{1}{32}$*d*. in April, 1919, to 2*s*. $10\frac{9}{16}$*d*. on the 11th February, 1920. The sterling exchange closely followed the fluctuations in silver prices, and when silver took a downward tendency exchange also declined. At the end of March, 1920, the rate stood at about 2*s*. 4*d*., eventually dropping to about 1*s*. 4*d*. a year later. The rapid rise and even more rapid fall in the sterling value of the rupee produced considerable reaction in the cotton trade. Dealers in imported goods were encouraged to place heavy orders when exchange rates were high. The sudden fall in exchange coincided with a fall in rupee prices and importers were faced with heavy losses. Several Associations of Piece Goods Merchants passed resolutions pledging their members not to favour contracts at a lower rate than 2*s*. per rupee and not to undertake fresh business in foreign piece goods. The consequent stagnation lasted many months. Gradually the situation eased and eventually most of the accounts were settled by compromise.

(ii) It was believed that the departure of the United Kingdom from the gold standard and the linking of the rupee to sterling at the existing rate of 1*s*. 6*d*. would stimulate imports from the United Kingdom as against those from countries such as the United States and Italy, which were still on the gold standard. Japan did not follow the example of the United Kingdom immediately, and it was believed that this too would give a brief respite to dealers in Manchester goods. The yen exchange rate on Bombay declined from Rs. 136·75 on September 19th, 1931, to Rs. 164·0 at the end of October and Rs. 183·75 at the end of November, and for a time Japanese exporters experienced difficulty in competing with Lancashire in the Indian market, but in December, 1931, by linking the yen to the rupee in the same relation as existed prior to Britain's departure from the gold standard, Japan placed herself in a position as favourable as that held by the United Kingdom.

(c) *Political Agitation and the Boycott of British Goods*. There is no doubt that the present condition of the cotton trade is attributable in no small measure to the direct and indirect effects of the political situation in India. As far back as 1905, the "Swadeshi" movement was inaugurated with the aim of encouraging the consumption of Indian products and of establishing industrial and commercial concerns under Indian management. The war gave an impetus to this movement for the encouragement of Indian industries. It was not, however, until 1921, when the non-co-operation movement was inaugurated, that active interference with trade was attempted. The movement took the form of a boycott of imported cloth and the advocacy of the use of hand-spun and hand-woven "khaddar"; whilst picketing of foreign cloth shops was conducted on a large scale in the principal towns. The campaign collapsed, however, with the arrest of the leader in March, 1922. After his release, Gandhi used his influence for some time against any boycott of British goods. The general political situation improved and for a few years there was no further active interference with trade; outbreaks of communal disturbances occurred in Calcutta and other parts of Bengal in 1926, but apart from the creation of a feeling of insecurity, and temporary hindrances in the movement of piece goods, there was no serious dislocation of trade. Despite the acute and widespread communal tension which has since persisted, the free movement of piece goods continued. In December, 1929, Congress, the extremist political organization, decided to launch a new campaign of "civil disobedience and boycott." The boycott started in April, 1930, but its effects were not felt until three months later. A general campaign against all imports of cotton manufactures was directed particularly against the products of the United Kingdom. Dealers were coerced and persecuted socially; and pressure was exercised to force them to abandon their trade in Lancashire goods. "Peaceful" picketing took a violent form. Not only did the direct effects of these activities dislocate trade, but the frequent *hartals* (closing of shops under threats), the closing of markets, the general feeling of insecurity and uncertainty combined to compel dealers, in their own interests, to carry little stock and to place as few orders as possible. The "Irwin and Gandhi pact" in March, 1931, brought about a cessation of the more violent activities, but Mr. Ainscough, H.M. Senior Trade Commissioner in India, in his recent report on United Kingdom Trade in India, states that—

> "forceful persuasion by countless so-called 'peaceful' means, such as threats of social ostracism and the hundred and one methods which are possible in this country is proceeding in the up-country towns and villages with undiminished vigour. The result is that the consumer in self-defence is turning to Indian-made goods and, so long as the agitation persists, he will continue to do so. So strong is the present movement that Indian mill products in many instances are commanding prices considerably in excess of those asked for Lancashire cloths of superior quality. This, however, can only be a temporary phase. The permanent feature, however, is that Bombay and Ahmedabad qualities will become established as the standard cloths on the market and it will be practically impossible to dislodge them."

The "truce" ended at the close of 1931 and early this year the boycott campaign, accompanied by the picketing of cloth shops and the intimidation of dealers, was once again resumed.

(d) *Fiscal Changes.* More far reaching and more permanent in their effects have been the fiscal changes. At the outbreak of war there was an import duty of 3½ per cent. *ad valorem* on cotton piece goods and a counteracting excise duty of 3½ per cent. on Indian-mill cloth. Indian hand-woven cloth was not taxed and there was no duty on cotton yarn. During the war the need for revenue compelled Government to raise the general import duty, and in 1917 the import duty on cotton piece goods was raised to 7½ per cent. *ad valorem*; the excise duty remained unchanged. Since the depression in 1920 necessitated the finding of additional revenue, the general import tariff (including the duty on cotton piece goods) was increased from 7½ per cent. *ad valorem* to 11 per cent. *ad valorem* in 1921. The Secretary of State for India in June of that year affirmed the principle laid down by the Joint Select Committee on the Government of India Bill, 1919, that " whatever be the right fiscal policy for India, for the needs of her consumers as well as for her manufacturers, it is quite clear that she should have the same liberty to consider her interests as Great Britain, Australia, New Zealand, Canada and South Africa." One of the first results of the affirmation of this fiscal convention was the appointment of the Indian Fiscal Commission (1922) " to examine with reference to all the interests concerned, the tariff policy of the Government of India, including the question of the desirability of adopting the principle of Imperial preference." Meanwhile, owing to the continuance of the acute financial situation, Government imposed a 5 per cent. *ad valorem* duty on imported cotton yarns (which had previously been free from duty since 1896). The Fiscal Commission presented their report in July, 1922, and in February, 1923, the Government of India announced that they accepted the principle of discriminating Protection for India and appointed a Tariff Board to investigate and advise the Government. During 1924 and 1925 Indian millowners, politicians and economists conducted a vigorous campaign for the removal of the cotton Excise Duty. The depressed condition of the Bombay cotton industry, due mainly to the growth of Japanese competition, influenced the Government to suspend the duty in December, 1925, and finally to abolish it in March, 1926. Three months later the Government of India appointed a second Tariff Board to enquire into the cotton textile industry in India, to examine the causes of the depression and to report whether the industry was in need of protection. Consequent upon their report and as a measure of protection for Indian mills against Japanese imports, the Indian Tariff (Cotton Yarn Amendment) Act was passed in September, 1927, substituting for the existing 5 per cent. *ad valorem* import duty on all cotton yarns an import duty of 5 per cent. *ad valorem* or 1½ as. per lb., whichever was higher. Since the incidence of the duty falls more heavily on the lower than on the higher yarns it has had little effect on the imports of British yarns. The general wave of depression from which India suffered in common with all other countries at the end of 1929 made increased taxation imperative. The Government decided in March, 1930, to raise the import duties on all cotton piece goods from 11 per cent. to 15 per cent. and, in addition, to impose a 5 per cent. protective duty against all cotton piece goods from outside the United Kingdom, with a minimum of 3½ as. per lb. on plain grey goods, whether of British or foreign manufacture; this protective duty to be in force for three years only until the re-examination of the position. For the first time in the history of the Indian cotton industry the principle of discriminating protection was applied. The year 1930 may well stand as a milestone in the progress of the industry. Once again, in March, 1931, the financial position of the country necessitated the imposition of a surcharge of 5 per cent. on cotton piece goods. Finally, the Emergency Budget introduced in October, 1931, placed a further surcharge of "one-quarter of existing rate on all customs import duties, including sur-charges imposed by the Finance Act, 1931." The outcome of this legislation has resulted in the import duty on British piece goods now standing at 25 per cent. and an additional 3½ as. per lb. on plain grey goods. The boycott campaign launched in April, 1930, coincided with the first of these protective measures. The combined effect of protection and boycott upon the imports of piece goods is shown in the following table :—

TABLE VIII.

India : Quantity of Cotton Piece Goods imported Monthly* 1929–30 *to* 1931–32.

(Million yards.)

Month.	1929–30.	1930–31.	1931–32.
April	213	164	71
May	155	134	54
June	100	91	69
July	141	72	68
August	171	73	62
September	160	49	65
October	132	43	63
November	148	36	48
December	134	46	45
January	194	62	71
February	157	46	63
March	179	67	73

Indian Mill Production and the Import Trade. I will now examine in detail the course of trade from 1919 to the present time.

* Excluding Tents.

The following table shows the import of cotton manufactures and Indian mill production during the period under review :—

TABLE IX.

India: Quantity of Cotton Manufactures produced by Mills and imported (1919–20 *to* 1930–31).

Year.	Yarn. (Million lb.)		Piece Goods. (Million yards.)	
	Indian Mill Production.	Imports.	Indian Mill Production.	Imports.
Pre-War Average ...	647	42	1,105	2,632
War Average ...	666	34	1,444	1,841
1919–20	636	15	1,640	1,081
1920–21	660	47	1,581	1,510
1921–22	693	57	1,732	1,090
1922–23	706	59	1,725	1,593
1923–24	617	45	1,702	1,486
1924–25	719	56	1,970	1,823
1925–26	686	52	1,954	1,564
1926–27	807	49	2,259	1,788
1927–28	809	52	2,357	1,973
1928–29	648	44	1,893	1,937
1929–30	834	44	2,419	1,919
1930–31	867	29	2,561	890
1931–32	—	32	—	776

The period opens with India suffering from the effects of the monsoon failure and the influenza epidemic. Imports of yarn reached the lowest figure since 1866–67 and piece goods had declined considerably. On the other hand, the Indian cotton industry was experiencing unparalleled prosperity. Production of cloth had increased to about 50 per cent. above pre-war figures and at the high level of prices, large profits were reaped by the mills. An analysis of the dividends paid by 58 leading Bombay mills in 1919 shows an average rate of distribution of 44 per cent.* The strong financial position enabled Indian millowners to construct new factories and to replace old plant with the latest machines (*vide* Appendix I, Table K). The mills were thus equipped for spinning and weaving goods of better qualities. The boom which started early in 1919 continued until 1922, when depression set in, especially in Bombay. Meanwhile, imports showed an all-round increase in 1920–21, but the unfortunate deadlock that arose as a result of the sharp rise and fall in exchange, to which reference has been made on p. 407, gave a set-back to trade in the following year. Recovery was not long delayed, since the collapse of the boycott movement and the improvement in the purchasing power of the masses led to increased imports in 1922–23. The temporary withdrawal of competition from Japan through the earthquake in that country in 1923, together with high prices of cotton goods, produced a reduction of imports in 1923–24. Most of the ground lost, however, was recovered in the following year, when Japan increased her shipments both of yarn and piece goods. The fall in prices of raw cotton tended to lead to cautious buying and restricted trade, but when the Marwari Chamber of Commerce, Calcutta, enforced restrictions on trading owing to the accumulation of stocks, confidence was restored and there was a revival of business in 1926–27 and 1927–28. A severe financial crisis, however, occurred in Japan in the spring of 1927 and the output of the companies forming the Japan Cotton Spinners' Association was restricted. In spite of the curtailment of production, Japan not only maintained her position in the market but increased her share of the trade. From 1928 to date imports have been adversely affected, and a general state of uncertainty has persisted. Many factors have contributed to this state of affairs. The uncertain movements of the raw cotton market and their effects on Manchester prices, the unsettled condition of the Lancashire cotton industry, the renewal of the boycott agitation, the control of imports by the Marwari Chamber of Commerce at Calcutta, the imposition of higher import duties and the reduced purchasing power of the ryot created by the heavy fall in the value of agricultural products have all combined to undermine confidence. When so many contributory factors have restricted trade, it is practically impossible to form a statistical assessment of the value of each. There is no doubt, however, that the depleted purchasing power of the masses has been one of the most important causes of the heavy fall in imports of cotton goods since 1929. Further, it cannot be denied that the unprecedented slump from April 1930 onwards is due to the combined effects of the increased tariff and the boycott movement. Although the results of this subversive political campaign against the import of cotton goods have been severe, they are temporary, unless in the meantime the Indian mills establish themselves more securely in the manufacture of finer yarns and better quality fabrics. More dangerous, however, to the future of Lancashire's interests in the Indian market is the trend of economic nationalism and its recent manifestation in the form of higher and still higher protection. Nevertheless, even at the present time a very serious state of affairs so far as Lancashire is concerned has been reached. Imports of piece goods have declined from 2,632 million yards in the pre-war quinquennium to 890 million yards in 1930–31 and 776 million yards in 1931–32, while imports of cotton twist and yarn have decreased from 42 million lb. pre-war to 29 million lb. in 1930–31 and 31½ million lb. in 1931–32. Indian mill production, on the other hand, has increased in the case of piece goods from 1,105 million yards (pre-war) to 2,561 million yards in 1930–31, and in the case of yarn from 647 million lb. to 867 million lb. Statistics of production for the year 1931–32 are not at present available. The depression in the mill industry, which was felt more acutely in Bombay than in other centres, lasted from 1923 to 1929. Notwithstanding, the output of the mills during this period showed almost continuous increase.* Considerable growth in Indian production followed the abolition of the Cotton Excise Duty in 1926; the output of piece goods reached double the pre-war figures.

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* *Capital*, May 26, 1921.

The figures for 1928–29 were unduly depressed owing to a general strike in the Bombay cotton mills which lasted from April to October, 1918, and involved nearly 150,000 employees. The absence of any severe labour troubles during the next two years, together with the combined effects of the enhanced import duties and the movement for boycotting foreign piece goods, created for the Indian mill industry in 1930–31 record figures of production, both in yarn and piece goods. The year 1931–32 promises even more favourable results for the Indian mills.†

We can now examine more closely the changes which have taken place in the trade.

Yarn Trade. The table on p. 414 sets forth the details of the different descriptions of cotton twist and yarn imported.

The main features disclosed by the table are the very great decline in the imports of coloured yarns, and the growing importance of the trade in mercerised yarns; since imports of grey yarns in recent years show a considerable advance upon pre-war figures.

Except for the years 1919–20, 1930–31 and 1931–32, the post-war annual volume of the import trade in yarns has been maintained above the pre-war level. There have been considerable changes, however, in the nature of the trade. First, Indian mills, as at the present day, practically controlled the market in counts 30's and under. But, whereas before the war imports exceeded the Indian mill production both in counts 31–40 and above 40's, to-day the position is reversed. In 1930–31, India produced 61 million lb. in counts 31–40 and 27

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* It may appear strange that during this period the output of the mills increased. The difficulties of working a system of short time in Bombay owing to the nature of the labour supply resulted in the accumulation of stocks and the prolongation of the depression.

† In presenting the Indian Budget in the Legislative Assembly on March 7, 1932, Sir George Schuster, the Finance Member, is reported to have said, "I claim that the Indian cotton-mill industry is the only large staple industry in the world which is not only fully employed but expanding to-day, and which increased its production for 1931 by about 400 million yards as compared with 1930."

TABLE X.

India: Quantity of Cotton Twist and Yarn imported, Pre-War and Post-War.

(Thousand lb.)

Year.	Grey (Un-bleached).	White (Bleached).	Coloured.	Mercerised.	Unspecified.	Total.
Pre-War Average	18,586*		17,978	—	5,230	41,794
1919–20 ...	6,842	1,077	6,355	470	353	15,097
1920–21 ...	32,082	2,040	11,805	1,280	126	47,333
1921–22 ...	43,776	2,520	10,010	794	25	57,125
1922–23 ...	48,983	1,894	7,027	1,320	50	59,274
1923–24 ...	31,256	2,650	8,645	2,019	4	44,575
1924–25 ...	41,277	3,427	8,483	2,664	57	55,907
1925–26 ...	37,958	3,751	7,107	2,845	27	51,688
1926–27 ...	35,765	4,062	5,370	4,169	59	49,425
1927–28 ...	36,144	4,813	5,976	5,365	47	52,345
1928–29 ...	30,704	5,068	3,891	4,077	25	43,766
1929–30 ...	28,521	5,279	4,326	5,722	34	43,882
1930–31 ...	19,898	3,975	1,732	3,526	10	29,140
1931–32 ...	—	—	—	—	—	—

* Separately recorded from April, 1919.

million lb. in counts above 40's against imports of 15 million lb. and 4 million lb. respectively. The Indian mills are producing yarn of higher counts in ever-increasing quantities. To enable the mills to spin finer yarn, shippers have imported large quantities of American cotton; 379,000 bales arrived in Bombay in 1926–27 and 103,000 bales in the following year. Imports of long-stapled Egyptian cotton have been heavy and reached the record figure of 12,000 bales in 1929–30. Secondly, until 1923 Japan dominated the import trade in the lower counts of yarn and even entered into serious competition with the Indian mills. After her recovery from the earthquake disaster of 1923, Japan left the low count trade to Indian mills and concentrated on yarns of higher counts, in which Lancashire was supreme. For two years Japan continued to gain ground in counts 31's to 40's and above 40's and by 1926–27 she was the main source of supply in the former class. Thirdly, from 1927–28 to the present day China has secured the largest share of the import trade in counts 31–40. The financial crisis in Japan in 1927 necessitated curtailment of production by the mills under the control of the Japan Cotton Spinners' Association. The Japanese accordingly found it of greater advantage to ship yarn from their mills in China than to export it direct from Japan. Moreover, the disturbed condition of China compelled the Japanese manufacturers in that country to find another market for their output, and consequently heavy shipments were made to India. As most of the mills in China

TABLE XI.

India : Quantity of Yarn Produced by Mills and Imported, by Counts.

(Thousand lb.)

	Counts Nos. 1–20.		Counts Nos. 21–25.		Counts Nos 26–30.		Counts Nos 31–40.		Counts above No. 40.		Two folds (double).		Unspecified Descriptions and Waste.		Total	
	Production	Imports.	Production	Imports.	Production.	Imports	Production.	Imports	Production	Imports.	Production	Imports.	Production	Imports	Production	Imports.
Pre-War Average	478,538	1,375	Included with counts Nos. 26–30		146,363	4,374	18,699	23,213	2,655	7,602	—	—	502	5,230	646,757	41,794
War Average	466,952	2,191	,,	,,	174,069	3,198	20,987	17,530	3,834	5,945	—	—	385	5,199	666,227	34,063
1919–20	431,188	458	,,	,,	183,657	1,007	17,080	6,852	3,560	3,592	—	1,288	275	1,900	635,760	15,097
1920–21	443,471	7,591	148,473	432	50,613	3,757	15,024	22,842	2,067	5,020	—	4,244	355	3,447	660,003	47,333
1921–22	469,370	6,961	150,579	1,219	52,538	4,238	16,900	26,741	2,389	8,882	—	5,746	492	3,338	692,313	57,125
1922–23	478,595	13,070	155,086	801	53,873	4,708	15,931	26,657	2,195	6,222	—	4,553	214	3,263	705,894	59,274
1923–24	403,440	6,857	124,398	473	57,349	993	19,666	19,807	3,261	7,739	—	4,033	514	4,673	608,628	44,575
1924–25	469,810	7,170	154,672	477	69,140	934	19,368	21,687	5,822	7,659	—	5,833	578	6,147	719,390	55,907
1925–26	444,748	4,772	142,759	543	71,029	575	19,738	26.294	5,834	6,685	—	6,195	2,319	6,624	686,427	51,688
1926–27	515,681	1,068	168,345	483	79,966	470	27,657	24,405	11,531	7,562	—	7,146	3,936	8,291	807,116	49,425
1927–28	494,800	2,465	182,235	416	80,836	439	33,757	27,305	11,142	8,040	—	13,633	6,170	47	808,940	52,345
1928–29	382,024	1,098	140,175	548	72,838	223	37,488	19,937	10,029	9,331	—	12,604	5,742	25	648,296	43,766
1929–30	493,382	1,047	181,245	290	90,579	395	46,365	20,050	15,279	9,013	—	13,053	6,710	34	833,560	43,882
1930–31	513,739	454	166,110	251	93,345	227	60,747	14,755	27,311	4,273	—	9,170	5,793	10	867,045	29,140
1931–32	—	308	Included with counts Nos. 26–30		—	750	—	14,308	—	5,252	—	10,938	—	19	—	31,575

are owned and controlled by Japanese interests, competition from China should be regarded as part of Japan's effort to control the import in yarns. Fourthly, the United Kingdom has lost ground both absolutely and relatively, especially since 1928–29. Before the War the imports from the United Kingdom were nearly 37 million lb. and formed 89 per cent. of the total imports; whereas in 1931–32 the corresponding figures were 12 million lb. and only 38 per cent. of the import trade. The shares of the United Kingdom and her Far Eastern competitors are given in Appendix I, Table B, and below :—

TABLE XII.

India: Percentage Shares of the Quantity of Cotton Twist and Yarn imported from the United Kingdom, Japan and China, Pre-War and Post-War.

Country whence Consigned.	Pre-War Average.	1913–14.	1918–19.	1919–20.	1920–21.	1921–22.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30.	1930–31.	1931–32.
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
United Kingdom	89	86	25	81	49	70	52	49	37	31	41	39	53	46	35	38
Japan	1	2	72	13	42	26	45	46	57	65	54	32	17	25	24	20
China (including Hong-Kong)...	—	—	3	3	5	—	—	—	1	—	2	25	26	24	40	42

The changes that have taken place since 1928–29 are brought out more clearly in Appendix I, Table C. Lancashire has lost ground chiefly in grey yarns and coloured yarns ranging from 31–40. Supplies of greys (which are largely 32's and 40's) are now mainly imported from the Japanese controlled mills in China. In coloured yarns, not only the imports from the United Kingdom but also those from Switzerland, Italy and Germany, her chief competitors in this trade, have declined heavily. It is satisfactory to note that in counts above 40's, whether they be grey, white or coloured, the United Kingdom supplies almost the entire imports. It is significant, however, that the trade in white (bleached) yarns above 30's, hitherto almost entirely controlled by Lancashire, has attracted the attention of Japan. Imports of mercerised yarns consist almost entirely of two-folds supplied by Japanese mills.

It is difficult to forecast future developments. Lancashire is unlikely to recover the trade she has lost in grey yarns under 40's. Japanese and Indian mills will menace her trade in grey yarns over 40's to an increasing extent although it is unlikely that Lancashire will lose her supremacy in yarns of the highest counts. Japanese manufacturers appear to be concentrating upon the trade in bleached yarns and may make serious inroads. The coloured yarn trade depends so largely upon changes in fashion and upon the price factor, that it would be hazardous to venture an opinion as to its future. From a comprehensive survey of the yarn trade, there seems little likelihood that Lancashire will recover lost ground in the near future; on the contrary, it is apparent that both India and Japan will encroach still further upon some of those sections at present controlled by the United Kingdom.

Piece Goods Trade. The details for the three main classes of piece goods imported into India in 1913–14 and from 1919–20 onwards are shown in the table below :—

TABLE XIII.

India : Imports of Cotton Piece Goods, Pre-War and Post-War.

Value.	Quantity. (Million yards)			Value. (Million £.)			Declared Value per Yard. 1913–14 = 100.		
	Grey (Unbleached).	White (Bleached).	Coloured, Printed or Dyed.	Grey (Unbleached).	White (Bleached).	Coloured, Printed or Dyed.	Grey (Unbleached).	White (Bleached).	Coloured, Printed or Dyed.
Pre-War Average *	1,331	654	632	14·1	7·5	8·6	—	—	—
1913–14* ...	1,534	793	832	17·0	9·5	11·9	100	100	100
1919–20† ...	534	322	208	22·5	16·0	12·8	253	272	288
1920–21† ...	580	422	489	26·5	21·9	34·6	275	286	332
1921–22* ...	636	306	138	15·1	8·4	5·1	212	226	256
1922–23* ...	931	402	244	20·3	10·0	8·4	197	206	242
1923–24* ...	704	415	347	15·4	10·3	11·8	197	206	239
1924–25* ...	846	549	407	19·0	13·5	13·3	203	203	230
1925–26‡ ...	709	465	366	16·4	12·0	11·9	189	189	202
1926–27‡ ...	748	571	447	14·7	13·2	12·9	156	169	180
1927–28‡ ...	876	556	505	15·9	11·6	13·1	147	157	163
1928–29† ...	839	554	507	15·1	11·5	13·0	144	151	161
1929–30‡	926	474	483	15·7	10·0	11·4	134	154	146
1930–31‡ ...	365	272	246	5·2	4·7	5·1	113	103	129
1931–32‡ ...	249	280	223	2·9	4·0	3·8	—	—	—

* Converted at exchange of 1*s.* 4*d.* per rupee.
† Converted at exchange of 2*s.* per rupee.
‡ Converted at exchange of 1*s.* 6*d.* per rupee.

All classes show a remarkable decrease, both in quantity and value. During the period 1919–20 to 1929-30, the quantity of grey goods imported averaged 57 per cent. of the pre-war level, while the corresponding percentages for white goods and coloured goods were 70 per cent. and 59 per cent. respectively. The great reduction in the imports of printed, dyed and coloured woven goods is one of the principal features of the post-war situation. The high finishing charges placed coloured goods beyond the reach of the masses and the ryots were compelled to turn to grey goods and to a less extent to bleached goods. Before the war, however, the popularity of coloured and bleached goods was principally due to their cheapness. Another factor which influenced the change from coloured goods to grey and white cloth, especially in 1921, was the campaign in favour of Khaddar cloth. The price factor, however, was the dominating consideration.

The figures of imports for 1931–32 are a striking contrast to those for 1913–14. Imports of greys in 1931–32 were only 16 per cent. of the quantity imported in the pre-war year; for white goods, the percentage is 35 and for coloured goods it is 27. The reduction in the imports of white cloth, although considerable, has not been so pronounced as in the case of grey and coloured goods. This is chiefly because the production of bleached goods by Indian manufacturers is at present small. The phenomenal slump in the imports of grey fabrics in 1930–1931 was undoubtedly due to India's reduced purchasing power, coupled with the boycott, political agitation and fiscal changes. The same disabilities account very largely for the great reduction in imports of coloured fabrics, although here the situation has been aggravated by the substitution, for dyed or printed cotton goods, of cheap artificial silk taffetas shipped from Japan.

Unfortunately, the statistics of Indian mill production do not enable a close comparison to be made between the imports and production of the three main classes of piece goods. The quantities of the two chief classes of piece goods woven in Indian mills are given in the following statement and may be compared on broad lines with the figures of imports in Table XIII above.

TABLE XIV.

India: Quantity of Main Classes of Piece Goods woven in Mills, Pre-War and Post-War.

(Million yards.)

Descriptions.	Pre-War average.	1913–14.	1919–20.	1920–21.	1921–22.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30.	1930–31.	1931–32.
Grey and Bleached Piece Goods ...	854	872	1,164	1,130	1,285	1,272	1,198	1,382	1,414	1,577	1,675	1,410	1,815	2,003	—
Coloured Piece Goods ...	251	292	476	451	447	453	504	588	540	681	682	484	601	558	—
Total...	1,105	1,164	1,640	1,581	1,732	1,725	1,702	1,970	1,954	2,259	2,357	1,893	2,419	2,561	—

It is estimated by Mr. G. S. Hardy, Cotton Tariff Officer, Calcutta, that not more than one per cent. of the piece goods classed as "grey and bleached" in the above table is bleached. If then the output of bleached goods is regarded as negligible, it will be seen that between the years 1913–14 and 1930–31, the production of grey piece goods in Indian mills increased by 1,132 million yards. It is significant that during the same period, the imports of grey piece goods decreased by 1,169 million yards. Allowance should be made, however, for the decline of 30 million yards in the export trade and diminished consumption as a result of the reduced purchasing power of the people. Even then it can be asserted with confidence that the increase in India's mill production of grey goods has been the prime cause of the decrease in the imports of foreign grey cloth. Similarly, as the output of Indian coloured goods has increased, imports of foreign coloured fabrics have declined. The Indian mills, however, suffered a set-back in their production in 1930–31, even though imports declined. Japanese artificial silk goods at 5*d.* and even 4*d.* per yard replaced many kinds of coloured cotton goods of Indian and foreign manufacture.

I will now examine in greater detail the import trade in the various varieties of piece goods (*vide* Appendix I, Tables E to J).

Grey (*unbleached*). The two most important classes in this section are the bordered dhutis, saris, etc. and the plain shirtings and longcloths. Unfortunately, owing to a change in classification by the transfer of white yarn dhutis from bleached goods to unbleached goods, a statistical comparison cannot be made respecting the grey dhuti trade between 1913–14 and 1930–31. Before the war this was a predominantly Lancashire trade. The heavy war-time fall in imports from the United Kingdom was partially recovered after the termination of hostilities, and by 1924–25 Lancashire met more than half the requirements of the market; the Indian mills supplied the rest. From 1925–26 the Indian mills took the lead and Japan also entered the market. The position since 1924 is summarised in the following table :—

TABLE XV.

India : Quantity of Grey Dhutis produced in Mills and imported, 1924–25 *to* 1930–31.

(Million yards.)

	1924–25	1925–26	1926–27.	1927–28.	1928–29.	1929–30.	1930–31.
Indian Mill Production... ...	458	516	586	616	564	776	831
Imports :							
From the United Kingdom ...	518	446	513	523	453	443	—
From Japan ..	1	14	29	24	35	57	—
Total Imports	519	460	542	557	488	500	—

Since 1928–29 the Indian mills have made marked progress and the Japanese have increased their share of the trade. The trade of the United Kingdom, on the other hand, has been severely damaged by the boycott, and business is now almost at a standstill.

Lancashire has suffered very greatly from Japanese competition in grey shirtings and longcloth. Lancashire dominated the trade in pre-war years, but by 1918–19 Japan had captured the import trade and the Indian mills had secured control of the market. After making a partial recovery in 1922–23 the United Kingdom has been gradually ousted from the market. The following table shows the changes that have occurred :—

TABLE XVI.

India : Quantity of Grey Shirtings and Longcloth produced in Mills and imported, Pre-War and Post-War.

(Million yards)

	Pre-War average.	1913–14.	1919–20	1920–21.	1921–22.	1922–23.	1923–24	1924–25	1925–26	1926–27	1927–28.	1928–29	1929–30	1930–31.
Indian Mill Production	288	292	445	456	487	471	444	526	521	581	620	474	585	642
Imports :														
From the United Kingdom	520	540	76	88	87	241	93	146	87	71	76	48	—	—
From Japan and China	2	5	38	93	41	39	26	61	84	97	157	203	—	—
Total Imports ...	523	545	114	182	129	280	119	207	171	169	233	252	—	—

The trade in fine goods—jaconets—has dwindled to one-third its former size and has suffered even more severely after 1930 when it was restricted by the tariff and by the reduced purchasing power of India. The supply still comes almost entirely from Lancashire.

Japan ousted the United Kingdom and the United States from a small trade in grey drills and jeans formerly held by them. Since 1930, however, the Indian mills appear to have driven the Japanese out of the market.

White (bleached). The trade in white cloth is essentially a luxury trade and consequently it has suffered from the reduced purchasing power of the people and from the rise in prices. At the close of the war people were compelled to practise economy and to substitute cheaper cloth for the finer and more expensive qualities. Moreover, some styles, such as nainsooks, were also affected by the changes in fashion. To these factors is attributed the heavy reduction in imports of bleached nainsooks from 200 million yards pre-war to 26 million yards in 1930–31. The fine weaves, white jaconets, mulls, etc., have shrunk to about one-half of the pre-war figure. The falling off in white shirtings and longcloth is not so marked as in the case of the other styles. The large decrease in white dhutis is mostly due to changes in customs classification in 1927, to which reference has already been made.

Lancashire retains a large share of the trade in bleached goods. The Netherlands compete in white shirtings and Switzerland in white jaconets, mulls and nainsooks. Japan entered the market during the war but made little progress. In 1919–20 the United Kingdom recovered her position and maintained her share of the trade until 1928–29. Then Japanese competition once again threatened the Lancashire trade. Large shipments of Japanese white shirtings, drills and nainsooks were made in 1929–30, followed by Japanese mulls at competitive prices in 1930–31. Imports of white goods from Japan advanced from 5 million yards in 1928–29 to 28 million yards in 1930–31, and to 60 million yards in 1931–32. The Japanese policy of getting a foothold and then extending her sphere of operations is clearly apparent in the bleached trade. Starting with shipments of white shirtings, Japan is now entering all the staple lines of the trade. Unless this move of the Japanese manufacturers is countered, the position of Lancashire in this valuable trade will be imperilled. As the output of bleached goods by Indian mills is almost negligible, it seems that the immediate future of the trade is dependent upon the steps which British manufacturers take to cope with the new situation.

Coloured. From 1919–20, imports of coloured goods were subdivided into "printed," "dyed" (in the piece) and "woven" (from dyed yarns). The course of trade in each of these sections is set out below :—

TABLE XVII

India : Quantity of Main Classes of Coloured Goods imported since the War.

(Million yards.)

	1919 –20.	1920 –21.	1921 –22	1922 –23.	1923 –24.	1924 –25.	1925 –26.	1926 –27.	1927 –28	1928 –29	1929 –30.	1930 –31.	1931 –32.
Printed Goods	117	284	85	128	182	189	167	177	235	244	200	106	105
Dyed Goods .	56	134	35	78	110	142	107	157	158	156	151	93	93
Woven Goods	35	71	19	38	55	76	92	114	111	107	132	46	25
Total Coloured Goods ...	208	489	138	244	347	407	366	447	505	507	483	246	223

One of the most striking changes from the point of view of Lancashire has been the decline in the print trade, which is the most important section of the coloured goods market. The formidable competition of Japanese artificial silk fabrics, to which reference has already been made, has affected both prints and woven goods. Since the bulk of the output of Indian coloured goods is woven from dyed yarns, Indian manufacturers have also felt the effects of this competition. The decrease in the imports of dyed goods is not so marked.

Appendix I Table G gives the imports of the several styles of coloured goods since the war. The slump in 1930–31 affected all sections of the trade and all interests alike. If, then, the comparison is made between 1913–14 and 1929–30, it will be seen that the imports of coloured drills and jeans, checks, spots and stripes and twills are above the pre-war quantities, particularly drills and jeans. The expansion in imports of drills almost corresponds with Japan's entry into the woven drill trade in 1922–23 and into the printed drill trade in 1926–27. The other most noteworthy features are the decline in "prints and chintz" from 159 million yards pre-war to 61 million yards in 1929–30, "dhutis, saris, etc.," from 96 million yards to 33 million yards, "cambrics" from 102 million yards to 43 million yards.

Lancashire still remains the main source of supply of the coloured goods imported into India. Japanese competition has grown rapidly during the last decade. H.M.'s Trade Commissioner in India reports that "Japanese competition is keen in printed drills, jeans, shirtings, flannelettes, and twills; and in coloured woven checks, spots, and stripes, drills and jeans, twills and shirtings. Even in velvets and velveteens, Japanese imports now approximate those from Lancashire." Continental countries, particularly Italy, have been giving serious attention to the Indian market for coloured goods. Woven coatings and trouserings, printed and dyed flannelettes and printed twills have been successfully marketed by Italy until the slump in 1930–31, when she suffered more than any other foreign supplier.

Japanese Competition. The percentage shares, before and after the war, of the United Kingdom and Japan in the different branches of the piece goods trade are set out below :—

TABLE XVIII.

India : Percentage Shares of the Quantity of Piece Goods imported from the United Kingdom and Japan, Pre-War and Post-War.

Countries whence Consigned.	Pre-War average.	1913 –14.	1919 –20.	1920 –21.	1921 –22.	1922 –23.	1923 –24.	1924 –25.	1925 –26.	1926 –27.	1927 –28.	1928 –29.	1929 –30.	1930 –31.	1931 –32.
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Grey Goods :															
United Kingdom	98·9	98·8	87·1	72·4	82·8	89·5	85·2	86·0	79·2	78·7	74·4	69 4	56·2	39·2	23·9
Japan	0·2	0·5	11·5	25·9	13·1	9·6	13·7	13·0	20·1	20·7	24·5	28 8	42·5	59·8	74·4
White Goods :															
United Kingdom	98·3	98·5	96·6	96·9	97·8	98·2	97·0	97·1	96 0	96·4	94·7	94·8	92·1	84·6	74·0
Japan	—	—	0·9	0·9	0 6	0·6	0·6	0·8	1·0	0·5	1·0	1·0	2·9	10·3	21·4
Coloured Goods :															
United Kingdom	93·5	92·6	89·9	91·8	88·0	86·9	87·4	83·1	73·1	71·1	69·8	66 2	57·6	60·0	49·4
Japan	0·1	0·2	5 0	3·3	3·6	6·3	6·7	10·0	19·0	19·2	20·3	21·7	31·9	30·2	42·4
Total Piece Goods :															
United Kingdom	97·4	97·1	90·3	85·6	87 6	91·2	88 8	88·5	82·3	82·0	78·2	75·2	65 0	58·8	50·1
Japan	0·1	0·3	7·0	11·3	8·3	6·8	8 2	8·5	13·9	13·6	16·4	18·4	29·3	36·1	45·2

The most striking feature of the above table is the phenomenal progress of Japan. In every branch of the trade she has increased her share at the expense of Lancashire. The share of Japan in grey goods has been increasing rapidly from 1924–25, until in 1930–31 for the first time in the history of the trade it exceeded that of the United Kingdom. Though her progress has not been so marked in coloured goods, Japan increased her share of that trade from 3·3 per cent. in 1920–21 to 42·4 per cent. in 1931–32, after a temporary set-back in 1930–31. It is only in bleached goods that Japan's share is small, yet even here it would seem that she is at last making serious inroads in this section of the trade as well. A comprehensive survey shows that Japan, starting almost from zero, has in less than twenty years captured nearly one-half of the import trade in piece goods.

Messrs. B. and H. Ellinger have dealt in an interesting paper read before this Society in January, 1930, with the advantages that Japan enjoys over the British industry. So far, however. as the Indian market is concerned, Japan has adopted a policy of gradual and persistent penetration based almost exclusively on the price factor. It must be admitted that the war gave her the opportunity of challenging Lancashire's supremacy in the Indian market, but the slump in 1920–21 shook her position very greatly and British distributors regained the position they formerly held as the chief importers of piece goods in Calcutta. Had Lancashire manufacturers taken advantage of the situation by quoting competitive prices and by placing their piece goods within the reach of the consumer, even suffering a temporary loss in order to do so, the history of the piece goods trade in India might well have been different. In the United Kingdom the enormous increase in post-war costs of production, heavy taxation, high freight rates, labour troubles and trade union regulations have all acted as handicaps to the British industry. The Japanese manufacturers, on the other hand, have many advantages over Lancashire manufacturers. Wages are lower, working hours are longer; two shifts of 8½ hours each plus two Sundays per month, total 476 working hours per month as against 184 in England; that is, their machinery works two and a half times as much as that of Lancashire, whilst their weavers attend more looms of the ordinary type than in Lancashire. "The three large cotton-buying companies control the purchase and supply of some 70 per cent. of the raw cotton and the sale of something like 60 per cent. of the total amount of the piece goods exported, while the members of the Japan Cotton Spinners' Association control the spinning of almost all the yarn."* Above all, the Japanese assisted by the Toyoda automatic loom have concentrated on the mass production of standard cloths at low prices; their manufacturers and agents have made a close study of the requirements of their market, and have availed themselves of every opportunity to nurse it. This is in striking contrast to what we read in the latest report of H.M.'s Trade Commissioner in India: "*It should be realized that unless steps are taken very quickly to re-establish the competitive power of United Kingdom goods we shall lose the valuable co-operation of many efficient distributing organizations upon which we have relied for more than half a century.* Meanwhile, Manchester merchants appear to be losing that close touch with the Indian situation which has been so valuable in the past. Travellers no longer visit India, correspondence falls off in these difficult times, and, to an observer on the spot, it sometimes appears as if the greatest single export trade in the world is gradually being allowed to 'peter out,' no active measures being taken to deal with the situation."

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* Report of the Cotton Mission, 1931.

In conclusion, the great change that has taken place in the Indian piece goods trade during the last twenty years can be summarized as follows:—

"In 1913–14, out of every 13½ yards of mill-made cotton cloth consumed per head in India, 10 yards were purchased from Lancashire and 3½ yards only were produced in the country. In 1930–31, out of every 9½ yards of cotton cloth consumed per head in India, only 1¾ yards were purchased from Lancashire, ¾ yards from Japan, whereas 7 yards were produced in India."

SUMMARY.

Before the war, India produced nine-tenths of the yarns which she consumed and met the balance of her requirements, mainly medium and fine yarns, almost entirely from the United Kingdom, but the Indian mills only supplied one-quarter of the mill cloth consumed in the country. Lancashire dominated all the branches of the import trade in piece goods, supplying nearly 99 per cent. of grey goods, 98½ per cent. of white goods and 92½ per cent. of coloured goods, which produced a total trade of 3,000 million yards valued at £35 million in 1913. The war handicapped British shippers and presented to Indian and Japanese manufacturers special opportunities of which they took advantage. Indian yarn production showed an increase which was marked in the case of counts above 40's. Imports from the United Kingdom declined from 37 million lb. pre-war to 9½ million lb. in 1918–19, while shipments from Japan increased from 400,000 lb. to 27 million lb The increase of Japanese yarns was especially marked in counts 31's to 40's and 16's to 20's.

The production of Indian mill cloth at the close of the war was one-third as great again as the pre-war average. The increase of Indian production synchronized with a reduction in imports from 2,600 million yards to 1,100 million yards. The British share of this diminished import trade fell from 97 per cent. pre-war to 77 per cent. in 1918–19, while that of Japan increased from 0·2 per cent. to 21 per cent. Japanese competition was mainly in grey goods, especially longcloth, shirtings and sheetings. After the war, Lancashire recovered part of the lost trade. The Indian mills, reconstructed and re-equipped from war profits, soon became formidable competitors. Further, the reduced purchasing power of the Indian masses coupled with the relatively high prices of British goods compelled consumers to turn their attention to the cheaper and coarser products of the Indian and Japanese mills. Much of the subsequent progress of the Indian mill industry was due to the abolition of the Cotton Excise Duty in 1926, to the adoption of "discriminating protection" in 1930 and to the boycott campaign. India increased her output of medium and fine yarns to such an extent that her share of the trade in counts above 40's rose from less than one-third of the market in pre-war years to nearly nine-tenths in 1930–31. Lancashire still controls almost the entire imports in counts above 40's but has lost ground chiefly in grey yarn and coloured yarn from 31's to 40's. Japanese mills in China have secured the largest share of the import trade in counts 31's to 40's. The United Kingdom has lost ground in the yarn trade as a whole, both absolutely and relatively. The imports from the United Kingdom decreased from 37 million lb. pre-war to 12 million lb. in 1931–32, and Lancashire's share of the import trade declined from 89 per cent. to 38 per cent.

Even greater changes have occurred in the piece goods trade. The production of Indian piece goods increased from 1,105 million yards pre-war to 2,561 million yards in 1930–31, whereas imports of foreign piece goods decreased from 2,632 million yards pre-war to 890 million yards in 1930–31 and 776 million yards in 1931–32. The British share in this decreased trade fell from 97 per cent. pre-war to 50 per cent.; while Japan, starting almost from zero, captured nearly one-half of the trade in less than twenty years. The increase in India's mill production of grey goods has been the prime cause of the decrease in imports of foreign grey cloth. Similarly, as the output of Indian coloured goods increased, imports of foreign coloured fabrics have declined. In pre-war days, Lancashire was dominant in the market for unbleached cloth and for coloured goods; now, Indian mills supply 85 per cent. of India's requirements of the former and 70 per cent. of the latter. The Indian mills have secured control of the market in grey shirtings, longcloth and dhutis, formerly held by Lancashire, while Japan has captured the import trade in grey shirtings and longcloth, and during the last five years has made great inroads in the grey dhuti trade. The trade in grey jaconets, almost entirely supplied by Lancashire, has dwindled to insignificant proportions. On the other hand, Lancashire retains a large share of the valuable trade in bleached goods, although imports of nainsooks have fallen heavily and imports of white jaconets, mulls, etc. have decreased to about one-half of the pre-war figure. Since 1929, Japanese competition in bleached goods has become keener each year and Lancashire's supremacy in all the staple lines is now threatened. Indian and British coloured goods are encountering serious competition from Japanese artificial silk fabrics. The Indian mills have more than doubled their production of coloured goods, mostly woven goods, since the war. Lancashire still remains the main source of the foreign supplies, but she has suffered from the great decline in the print trade. Japanese competition in all branches of the coloured trade has grown rapidly during the last decade. The remarkable transformation that has taken place in the trade in grey and coloured piece goods is shown in the following summary table :—

	Grey Piece Goods. (Million yards.)			Coloured Piece Goods. (Million yards.)		
	Pre-War Average.	1930–31.	1931–32.	Pre-War Average.	1930–31.	1931–32.
Indian Mill Production ...	850 (est.)	2,000 (est.)	—	251	558	—
Imports from :						
United Kingdom	1,316	143	60	590	148	110
Japan	3	218	185	1	74	97

The most striking feature which stands out from this survey is that the very considerable decrease in the demand for Manchester goods in India is due primarily to the rapid progress that Indian mills have made in nearly all the staple lines of the grey and coloured piece goods trade; and secondly, to Japanese competition. The dominant consideration in determining the demand for cotton goods in India is the price factor, and until Lancashire manufacturers can quote competitive prices there is little hope that Lancashire will recover her former position or even maintain her present share of the trade. The remarkable success of the Japanese manufacturers is due to their policy of gradual and persistent penetration based almost exclusively on the price factor. The Japanese have concentrated on the mass production of standard cloths at low prices.

A self-governing India, freely using the tariff weapon, will make it increasingly difficult for Lancashire to hold her own. Nevertheless, though for some years to come, Lancashire should hold the trade in yarns of the highest counts, in bleached goods, in fine grey jaconets and dhutis and in dyed goods, much will depend upon the efforts made by Lancashire manufacturers to keep in touch with the market, to place their goods at competitive prices and to counter the efforts of their Far Eastern competitor.

APPENDIX I.

TABLE A.

India: Cotton Mills.

Years ended March 31.	No. of Mills.	No. of Looms.	No. of Spindles.	Nos. Employed. Daily Average.	Mill Production.	
					Piece Goods.	Yarn.
		000's	000's	000's	Million yards.	Million lb.
1883–84 ...	74	16	1,895	62	—	—
1893–94 ...	138	29	3,540	131	—	—
1903–04 ...	206	45	5,168	186	589	579
1913–14 ...	264	97	6,621	261	1,164	683
1914–15 ...	255	103	6,598	260	1,136	652
1915–16 ...	267	108	6,676	276	1,442	722
1916–17 ...	267	111	6,670	277	1,578	681
1917–18 ...	269	115	6,614	284	1,614	661
1918–19 ...	264	116	6,591	290	1,451	615
1919–20 ...	263	118	6,714	306	1,640	636
1920–21 ...	255	118	6,652	328	1,581	660
1921–22 ...	271	128	6,814	342	1,732	694
1922–23 ...	289	137	7,245	357	1,725	706
1923–24 ...	310	147	7,903	350	1,702	617
1924–25 ...	305	151	8,286	376	1,970	719
1925–26 ...	303	155	8,403	371	1,954	686
1926–27 ...	306	158	8,413	384	2,259	807
1927–28 ...	296	159	8,236	434	2,357	809
1928–29 ...	293	165	8,493	524	1,893	648
1929–30 ...	—	—	—	—	2,419	834
1930–31 ...	—	—	—	—	2,561	867

TABLE B.

India: Cotton Twist and Yarn imported from the Principal Countries.

(Thousand lb.)

Year.	Countries whence Consigned.								Total.
	United Kingdom.	Japan.	China.	Italy.	Switzerland.	Netherlands.	Hong-Kong.	Other Countries.	
Pre-War Average	37,050	458	15	607	1,132	1,360	25	1,147	41,794
1913–14	37.836	1,000	—	1,042	1,275	1,561	78	1,379	44,171
1914–15	37,395	922	10	857	824	1,984	7	865	42,864
1915–16	36,941	702	—	590	631	909	—	654	40,427
1916–17	24,476	4,008	—	21	92	242	—	691	29,530
1917–18	14,947	4,206	—	19	145	—	—	83	19,400
1918–19	9,612	27,280	1,058	—	4	—	89	52	38,095
1919–20	12,230	1,918	160	115	70	8	338	258	15,097
1920–21	23,396	20,123	2,285	208	417	145	450	309	47,333
1921–22	40,074	14,915	22	407	829	463	43	372	57,124
1922–23	31,018	26,547	80	312	724	394	64	135	59,274
1923–24	21,790	20,430	140	391	982	383	68	391	44,575
1924–25	20,759	32,325	399	215	1,097	561	1	550	55,907
1925–26	15,980	33,525	56	410	898	473	Included	346	51,688
1926–27	20,016	26,619	945	314	691	486	in	263	49,125
1927–28	20,559	16,975	12,866	425	484	588	China	446	52,344
1928–29	23,094	7,632	11,420	811	360	—	—	449	43,766
1929–30	20,112	10,870	10,575	1,429	694	36	—	166	43,882
1930–31	10,315	6,895	11,743	64	74	15	—	34	29,140
1931–32	11.913	6,206	13,215	142	51	—	—	47	31,575

TABLE C.

India : Quantity of Main Classes of Yarn imported from Principal Countries, by Counts, 1928–29 *to* 1930–31.

Counts.	1928–29.				1929–30.				1930–31.				1931–32.			
	United Kingdom.	Japan.	Other Countries.	Total.	United Kingdom.	Japan.	Other Countries.	Total.	United Kingdom.	Japan.	Other Countries.	Total.	United Kingdom.	Japan.	Other Countries.	Total.
Grey Yarns :																
Nos. 1–20...	743	12	70	825	691	—	112	806	208	43	12	263	77	6	34	117
„ 21–30...	322	131	—	152	393	—	1	391	231	1	2	236	325	148	—	172
„ 31–40...	3,217	2,141	10,914	16,272	2,739	2,780	9,994	15,512	884	2,095	10,152	13,131	1,224	376	11,172	12,771
Above 40	7,777	10	27	7,814	7,112	31	19	7,196	3,010	10	71	3,094	1,383	6	1	1,389
Two-folds	2,962	1,138	1,241	5,312	1,176	2,013	1,393	4,612	809	826	1,539	3,173	1,121	439	2,145	3,709
Total	15,021	3,432	12,252	30,704	12,111	4,857	11,519	28,521	5,145	2,975	11,779	19,898	7,132	971	13,352	21,458
White Yarns :																
Nos. 1–20...	1	—	—	1	1	2	—	3	1	—	—	1	6	—	—	6
„ 21–30...	36	—	—	36	58	3	2	63	12	—	2	13	29	—	—	29
„ 31–40...	1,164	8	1	1,173	1,556	20	36	1,613	929	18	—	946	1,011	8	4	1,023
Above 40	1,128	11	—	1,140	1,290	32	—	1,322	825	40	—	865	600	9	—	609
Two-folds	2,285	406	28	2,719	1,791	467	21	2,280	1,750	391	8	2,149	1,548	113	10	1,972
Total	4,614	425	29	5,068	4,696	521	59	5,279	3,517	449	10	3,975	3,194	431	14	3,640
Coloured Yarns :																
Nos. 1–20	273	—	—	273	217	—	—	217	185	—	1	186	185	—	—	185
„ 21–30...	259	—	11	270	221	—	10	231	221	—	7	228	235	—	13	248
„ 31–40...	1,739	66	684	2,489	1,662	52	1,209	2,923	566	4	108	678	441	—	66	507
Above 40	321	—	31	355	382	2	72	456	261	—	23	283	222	—	9	231
Two-folds	499	1	3	501	481	12	6	499	338	17	1	356	232	—	1	232
Total	3,094	67	729	3,891	2,963	66	1,297	4,326	1,571	21	140	1,732	1,314	—	89	1,403
Mercerised Yarns :																
Two-folds	323	3,691	26	4,010	288	5,371	2	5,662	69	3,420	—	3,489	249	4,776	1	5,026

TABLE D.

India: Quantity of Grey and Bleached Piece Goods produced by Mills.

(Million yards.)

Year.	Dhutis.	Shirtings and Longcloth.	Khadi, Dungri or Khaddar.	Chaddars.	T-cloths, Domestics and Sheetings.	Drills and Jeans.	Tent Cloth.	Printers.	Cambrics and Lawn.	Other Sorts.	Total.
Pre-War Average	269	288	—	64	140	26	6	31	5	20	854
1913–14	285	292	—	70	129	28	6	30	5	27	872
1914–15	259	321	—	66	134	31	9	28	4	30	881
1915–16	324	420	—	75	151	46	12	27	6	34	1,095
1916–17	301	428	—	68	192	57	17	32	6	36	1,136
1917–18	325	451	—	54	137	79	25	27	8	36	1,141
1918–19	369	394	—	38	111	54	37	23	5	46	1,077
1919–20	338	445	—	68	122	81	7	30	8	67	1,164
1920–21	340	436	—	59	97	74	8	28	6	61	1,130
1921–22	456	487	—	59	84	60	7	36	7	88	1,285
1922–23	431	471	—	63	81	56	7	39	6	118	1,272
1923–24	399	444	—	58	65	55	7	35	4	128	1,198
1924–25	458	526	87	62	78	77	10	33	5	47	1,382
1925–26	516	521	87	62	74	74	9	26	3	41	1,414
1926–27	586	581	99	66	93	80	7	21	3	43	1,577
1927–28	616	620	116	67	92	91	6	20	5	41	1,675
1928–29	564	474	91	57	75	76	7	22	5	35	1,410
1929–30	776	585	125	66	91	100	8	19	4	41	1,815
1930–31	831	642	175	54	122	81	9	19	29	41	2,003
1931–32	—	—	—	—	—	—	—	—	—	—	—

TABLE E.

India: Imports of Grey (Unbleached) Piece Goods.

Year.	Quantity. (Million yards.)								Value. Rs. Lakhs.
	Dhutis, Saris, Scarves and Chaddars.	Jaconets, including Mulls, Madapollams, Cambrics, etc.	Longcloth and Shirtings.	T-cloths and Domestics.	Drills and Jeans.	Sheetings.	Unspecified.	Total.	
Pre-War Average	647	128	522	7	21	1	2	1,331	2,132
1913–14	809	150	545	6	21	—	3	1,534	2,544
1914–15	666	111	515	5	19	1	3	1,320	2,129
1915–16	612	102	406	2	23	2	1	1,148	1,809
1916–17	532	83	185	—	21	35	1	847	1,687
1917–18	398	63	123	3	8	30	1	626	1,843
1918–19	304	49	160	3	14	54	—	584	2,359
1919–20	347	41	114	2	10	18	—	534	2,251
1920–21	292	39	182	3	18	46	—	580	2,645
1921–22	384	55	139	—	16	50	2	636	2,265
1922–23	507	84	280	1	14	45	—	931	3,044
1923–24	433	73	119	1	17	61	—	704	2,306
1924–25	492	89	207	1	17	39	1	846	2,849
1925–26	430	57	171	—	19	30	2	709	2,189
1926–27	471	73	169	1	15	18	1	748	1,962
1927–28	528	79	233	—	11	23	1	876	2,125
1928–29	487	79	252	—	12	6	3	839	2,019
1929–30	501	53	340	—	13	15	3	926	2,093
1930–31	171	19	166	—	2	4	2	365	687
1931–32	—	—	—	—	—	—	—	249	392

TABLE F.

India : Imports of White (Bleached) Piece Goods.

Year.	Quantity. (Million yards.)									Value. Rs. Lakhs.
	Dhutis, Saris, Scarves and Chaddars.	Jaconets Madapollams, Mulls, etc.	Longcloth and Shirtings	Nainsooks.	Drills and Jeans.	Checks, Spots and Stripes	Twills.	Other Sorts.	Total.	
Pre-War Average	72	208	129	199	6	13	5	22	654	1,122
1913–14	107	308	115	205	6	16	8	28	793	1,438
1914–15	105	213	116	135	5	10	7	13	604	1,086
1915–16	53	176	163	171	7	13	11	18	611	1,068
1916–17	65	183	123	169	7	11	9	23	590	1,279
1917–18	42	165	113	150	3	5	7	17	502	1,420
1918–19	36	134	66	27	4	1	2	16	287	1,312
1919–20	38	120	77	59	3	4	6	14	322	1,596
1920–21	36	106	109	122	6	9	13	22	423	2,190
1921–22	32	144	48	68	2	2	3	8	306	1,267
1922–23	45	166	69	91	3	6	6	16	402	1,501
1923–24	46	173	67	88	3	8	7	22	415	1,544
1924–25	69	195	123	105	6	11	13	26	549	2,023
1925–26	73	178	94	77	6	7	12	18	465	1,599
1926–27	114	235	97	66	5	12	12	30	571	1,753
1927–28	72	224	112	93	7	14	15	19	556	1,542
1928–29	43	258	123	77	6	13	18	17	554	1,533
1929–30	45	220	104	53	7	12	17	16	474	1,328
1930–31	15	135	72	26	4	4	8	8	272	621
1931–32	—	—	—	—	—	—	—	—	280	533

TABLE G.

India : Imports of Coloured Piece Goods.

Year.	Quantity. (Million yards.)									Value. Rs. Lakhs.
	Dhutis, Saris and Scarves.	Cambrics, etc.	Shirtings.	Prints and Chintz	Drills and Jeans.	Checks, Spots and Stripes	Twills	Other Sorts	Total	
Pre-War Average	96	102	106	159	21	—	27	120	631	1,295
1913–14	115	114	153	210	30	20	31	160	832	1,786
1914–15	100	72	77	105	20	10	17	94	495	1,046
1915–16	57	41	56	86	20	9	12	78	359	856
1916–17	64	49	64	107	20	17	16	117	455	1,509
1917–18	41	51	61	101	23	11	23	85	396	1,615
1918–19	21	29	25	70	17	5	11	49	227	1,182
1919–20	23	29	28	49	7	6	7	58	208	1,275
1920–21	42	54	72	115	19	13	31	142	489	3,457
1921–22	21	18	25	29	10	4	6	27	138	759
1922–23	25	36	38	45	16	6	9	68	244	1,260
1923–24	33	44	52	61	17	8	17	115	347	1,769
1924–25	46	44	69	59	25	15	22	125	407	2,002
1925–26	30	35	72	56	32	11	20	109	366	1,592
1926–27	35	43	91	50	42	17	29	136	447	1,722
1927–28	38	50	89	70	64	18	40	134	505	1,752
1928–29	36	50	95	75	58	22	48	123	507	1,735
1929–30	33	43	106	61	87	26	37	91	483	1,515
1930–31	19	20	55	34	33	12	16	56	246	682
1931–32	—	—	—	—	—	—	—	—	223	505

TABLE H.

India: Quantity of Grey (Unbleached) Piece Goods imported from Principal Countries of Consignment.

(Million yards.)

Year.	Countries whence Consigned.					Total.
	United Kingdom.	Japan.	China.	United States.	Other Countries.	
Pre-War Average ...	1,316·0	2·6	—	10·4	2·1	1,331·1
1913–14	1,516·0	7·1	—	9·8	1·3	1,534·2
1914–15	1,294·7	15·3	—	9·5	0·7	1,320·2
1915–16	1,099 0	34·9	0·2	13·6	0·5	1,148·2
1916–17	762·0	75·6	1·1	7·8	0·5	847·0
1917–18	545·0	73·3	1·1	5·6	0·5	625·5
1918–19	375·3	206·8	—	0 3	1·0	583·4
1919–20	464·6	62·7	—	5·4	0·6	533·3
1920–21	420·3	150·4	0·7	8·4	1·0	580·2
1921–22	526 5	83·5	—	21·2	4·4	635·6
1922–23	833·3	90·0	2·8	4·4	0·4	931·0
1923–24	599·7	96·9	6·3	0·5	1·2	704·0
1924–25	727·4	109·8	4·8	2·6	0·9	845·5
1925–26	561·4	142·6	2·2	2·5	0·4	709·1
1926–27	588·8	154·9	1·8	2·7	0·2	748·4
1927–28	651·2	214·8	6·9	2·2	0·4	875·5
1928–29	581·6	241·7	13·3	1·6	0·4	838·6
1929–30	520·5	393·7	9·7	0·9	0·7	925·5
1930–31	143·3	218·3	2·5	0·5	0·4	365·0
1931–32	59·7	185·2	4·0	0·5	0·1	249·4

TABLE I.

India: Quantity of White (Bleached) Piece Goods imported from Principal Countries of Consignment.

(Million yards.)

Year.	Countries whence Consigned.					Total.
	United Kingdom.	Japan.	Switzerland.	Netherlands.	Other Countries.	
Pre-War Average ...	642·9	—	2·6	7·6	1·1	654·3
1913–14	781·4	0·1	2·9	8·2	0·8	793·3
1914–15	595·5	0·1	1·0	7·2	0·4	604·2
1915–16	601·4	0·9	1·6	6·6	0·9	611·4
1916–17	582·2	2·6	1·0	3·4	0·6	589·8
1917–18	496·2	2·6	0·2	1·8	1·6	502·4
1918–19	274·9	10·5	—	0·1	1·1	286·6
1919–20	311·0	2·8	0·6	4·1	3·6	322 0
1920–21	408·6	3·8	2·2	5·8	1·3	421·8
1921–22	299·3	1·9	0·2	4·4	0·4	306 2
1922–23	395·4	2·4	1·0	3·2	0·5	402·5
1923–24	402·9	2·3	4·7	4·5	1·0	415·4
1924–25	532·9	4·5	4·9	5·4	1·2	548·9
1925–26	446 3	4·7	5·8	6·3	2·0	465·1
1926–27	550·3	2·9	8·6	6·0	3·2	571·0
1927–28	526·8	5·6	12·2	7·5	4·4	556·5
1928–29	525·4	5·5	8·7	8·4	6·1	554·1
1929–30	435·9	13·9	8·6	7·5	7·7	473·6
1930–31	230·0	28·1	5·4	4·3	3·9	271·6
1931–32	207·0	59·8	5·9	3·5	3·3	279·7

TABLE J.

India: Quantity of Coloured Piece Goods imported from Principal Countries of Consignment.

(Million yards.)

Year.	Countries whence Consigned.								Total.
	United Kingdom.	Japan.	Netherlands.	Italy.	Belgium.	Switzerland.	Strait Settlements.	Other Countries.	
Pre-War Average	590·5	0·5	15·2	10·3	4·1	2·7	1·5	6·8	631·6
1913–14 ...	770·4	1·7	16·2	22·5	7·3	3·0	0·9	9·8	831·8
1914–15 ...	463·6	0·7	13·1	10·0	2·2	2·1	0·5	2·6	494·8
1915–16 ...	322·5	3·3	14·3	13·0	0·4	2·8	1·2	1·2	358·7
1916–17 ...	403·7	21·9	11·1	14·2	0·1	2·1	0·9	1·0	455·0
1917–18 ...	363·0	18·7	4·5	7·0	—	1·1	0·3	1·0	395·6
1918–19 ...	201·3	20·8	1·0	1·3	—	0·5	0·4	2·0	227·3
1919–20 ...	187·0	10·5	3·4	1·4	0·1	1·0	1·4	3·6	208·3
1920–21 ...	448·6	16·1	7·6	9·8	2·8	1·9	0·4	2·1	489·3
1921–22 ...	121·6	4·9	7·6	2·3	0·2	0·6	0·5	0·5	138·3
1922–23 ...	211·9	15·4	9·9	1·9	0·1	1·6	1·9	1·1	243·8
1923–24 ...	303·7	23·4	6·4	5·6	0·8	2·6	2·6	2·3	347·5
1924–25 ...	338·4	41·0	6·2	9·6	0·9	2·5	3·8	4·5	407·0
1925–26 ...	267·4	69·5	10·1	9·8	0·9	1·5	3·1	3·4	365·8
1926–27 ...	318·3	85·8	13·7	15·6	2·2	3·2	3·3	5·4	447·4
1927–28 ...	352·2	102·7	12·1	24·6	1·7	2·5	3·2	5·9	504·8
1928–29 ...	335·6	109·8	11·3	36·1	2·2	2·3	2·1	7·6	506·9
1929–30 ...	278·6	154·3	14·2	23·0	0·9	1·6	1·5	9·4	483·5
1930–31 ...	147·6	74·3	8·5	8·7	0·4	0·7	0·7	4·7	245·8
1931–32 ...	110·3	94·7	3·1	9·9	0·2	1·6	0·4	3·1	223·2

TABLE K.

India: Value of Cotton Textile Machinery Imported.

(Rs. Lakhs.)

Year.	Spinning	Weaving.	Bleaching and Dyeing.	Other Sorts.	Total.
1919–20	—	—	—	—	131
1920–21	151	150	5	60	366
1921–22	458	226	18	62	764
1922–23	652	140	14	44	849
1923–24	397	111	8	44	560
1924–25	151	69	8	39	267
1925–26	121	64	4	46	235
1926–27	80	60	3	27	170
1927–28	101	72	5	19	197
1928–29	124	67	4	21	216
1929–30	124	67	3	17	210
1930–31	113	53	2	11	178
1931–32	110	69	3	10	193

TABLE L.

India: Quantity of Cotton Goods imported Monthly, 1930–31 *and* 1921–32.

Month.	Cotton Piece Goods. (Million yards)						Cotton Twist and Yarn. (Million lb)	
	Grey.		White.		Coloured.			
	1930–31.	1931–32.	1930–31.	1931–32.	1930–31	1931–32	1930–31	1931–32
April ...	74	29	48	25	42	17	2·8	3·5
May ...	63	19	40	22	31	14	3·2	2·3
June ...	36	25	29	27	26	17	3·0	2·1
July ...	28	22	24	24	21	18	2·6	2·3
Aug. ...	24	16	22	26	27	21	1·4	1·7
Sept. ...	17	17	12	25	19	22	2·5	2·6
Oct. ...	15	22	13	18	14	23	2·6	2·7
Nov. ...	16	17	11	16	9	14	2·0	2·4
Dec. ...	24	16	13	15	9	14	1·8	3·5
Jan. ...	29	24	17	25	16	23	2·3	4·2
Feb. ...	15	26	16	20	14	17	2·1	2·2
Mar. ...	24	18	26	31	17	24	2·8	2·0
	365	249	272	280	246	223	29·1	31·6

TABLE M.

India: Quantity of Cotton Goods imported, distinguishing Principal Countries of Consignment, 1930–31 *and* 1931–32.

Countries whence Consigned.	Cotton Piece Goods. (Million yards)						Cotton Twist and Yarn. (Million lb)	
	Grey.		White.		Coloured.			
	1930–31	1931–32.	1930–31	1931–32.	1930–31.	1931–32	1930–31	1931–32.
Imports from :								
United Kingdom	143	60	230	207	148	110	10·3	11·9
Japan	218	185	28	60	74	95	6·9	6·2
China	2	4	—	—	—	—	11·7	13·2
All Countries ...	365	249	272	280	246	223	29·1	31·6

APPENDIX II.

Imports of Miscellaneous Cotton Manufactures into India.

In addition to the three main classes of piece goods, there are various subsidiary classes of cotton goods, *viz.* hosiery, handkerchiefs, fents of all descriptions and sewing thread.

Hosiery.—Even before the war Japan supplied two-thirds (in value) of the total imports, thus dominating the trade in hosiery; the bulk of the remaining imports were supplied by Germany. These imports from Japan have an interesting origin. During the Russo-Japanese War, Japan greatly increased her production of knitted goods, and on the termination of hostilities in 1907, manufacturers were confronted with large surplus stocks for which markets were wanted. India offered a suitable market and was soon flooded with cheap Japanese hosiery consisting mainly of light singlets, socks, etc., which on account of their low prices found a ready sale in the bazaars.

The elimination of the Central European Powers from the Indian market during the Great War enabled Japan to secure an even larger share of the trade. Since the war, Japanese manufacturers have strengthened their position; in 1931–32 they supplied 87½ per cent. of the imports. The value of imports during the last three years, compared with the average imports in the pre-war quinquennium, are given below:—

	Value. (Rs. Lakhs.)			
	Pre-war Average.	1929–30.	1930–31.	1931–32.
Imports from:				
United Kingdom ...	6	1	1	1
Japan	69	123	76	42
Other Countries	20	20	11	6
Total Imports	95	144	88	49

Fents.—The import of fents forms a purely waste-product trade. India imported 38 million yards in 1913–14, of which the United Kingdom supplied 36½ million yards. Shipments declined during the war until they reached 24½ million yards in 1918–19. Of this quantity, the United Kingdom consigned 15½ million yards and the United States nearly 9 million yards. Since the war, American competition has increased, and by 1927–28 imports from the United States exceeded those from the United Kingdom, both in quantity and in value. The position in 1929–30, 1930–31 and 1931–32, as compared with the average for the two years 1912–13 and 1913–14, was as follows :—

	Quantity. (Million yards.)			
	Average 1912–13 and 1913–14.	1929–30.	1930–31.	1931–32
Imports from :				
United Kingdom ...	35·9	12·5	2·5	6·5
United States	0·4	23·9	4·8	16·4
Other Countries	0·8	0·4	0·2	0·4
Total Imports	37·1	36·7	7·6	23·3

Handkerchiefs and Shawls.—Almost the entire pre-war imports of handkerchiefs and shawls came from the United Kingdom, but during the war there was a considerable decrease in shipments. After a partial recovery, however, the trade has steadily decreased to the insignificant proportions shown in the subjoined table.

	Quantity. (Millions.)			
	Pre-war Average.	1929–30.	1930–31.	1931–32.
Imports from :				
United Kingdom ...	22·0	9·0	3·1	1·5
Other Countries	2·0	1·4	0·8	0·3
Total Imports	24·0	10·4	4·0	1·8

Cotton Sewing Thread.—Since India does not manufacture sewing cotton, the effect of the boycott in 1930 has not been so pronounced in the sewing-cotton trade as in that of other cotton goods, and the United Kingdom holds much the same position in the trade as it did before the war. The comparative figures are as follows :—

	Quantity. (Million lb.)			
	Pre-war Average.	1929–30.	1930–31.	1931–32
Imports from :				
United Kingdom ...	1·3	2·0	1·6	1·6
Other Countries	0 3	0·4	0·3	0·2
Total Imports	1·6	2·4	1·9	1·8

APPENDIX III.

The Import Trade in Cotton and Artificial Silk Piece Goods.

A feature of the war and post-war period has been the trade in piece goods of cotton and artificial silk. This trade has grown very rapidly since 1922. Before that year the United Kingdom supplied the bulk of India's requirements; Italy being her only competitor. By 1923–24, however, Switzerland and Germany entered the market and competition from Italy became more serious; the share of the trade taken by Italy and other continental countries continued to increase, while the British share decreased. In 1928–29, imports from Italy exceeded those from the United Kingdom, both in quantity and value. Meanwhile, there was a remarkable increase in imports from Japan from 9,000 yards valued at Rs. 10,000 in 1925–26 to 3·8 million yards valued at over Rs. 30 lakhs in 1928–29. The Far Eastern competitor continued to progress and in the following year she monopolized the market. In 1931–32 Japan supplied nearly 90 per cent. of the trade; her shipments in that year reached record figures, viz. 74½ million yards valued at over Rs. 200 lakhs. At one time it was hoped that British mills would secure this growing trade and would make good to some extent the losses incurred in other directions. Unfortunately, British artificial silk goods could not compete with the lower prices of the Italian and Japanese products. The change which has taken place in the trade since the war is shown in the following table :—

India : Imports of Cotton and Artificial Silk Goods.

Year.	Countries whence Consigned.													
	Quantity. Million yards.)							Value. (Rs. Lakhs.)						
	United Kingdom.	Japan.	Italy.	Switzerland.	Germany.	Other Countries.	Total.	United Kingdom.	Japan.	Italy.	Switzerland.	Germany.	Other Countries.	Total.
1919–20	5·8	—	0·3	—	—	—	6·1	59	—	4	—	—	—	63
1920–21	7·0	—	0·5	—	—	—	7·5	97	—	8	1	—	—	106
1921–22	0·5	—	0·1	—	—	—	0·6	6	—	1	—	—	1	8
1922–23	1·0	—	0·3	—	0·2	—	1·5	13	—	5	—	2	—	20
1923–24	4·5	—	2·4	0·8	0·4	0·5	8·6	58	—	26	12	4	4	104
1924–25	8·2	—	5·0	2·1	0·8	0·9	17·0	83	—	44	29	8	12	176
1925–26	6·5	—	5·0	2·3	0·6	1·0	15·4	58	—	37	25	7	10	137
1926–27	16·1	—	13·9	6·7	2·5	2·8	42·0	117	—	81	59	27	25	309
1927–28	14·3	1·1	16·0	11·1	4·7	6·0	53·1	99	10	91	89	53	44	386
1928–29	12·6	3·8	17·8	7·0	2·5	6·0	49·8	84	30	93	53	27	43	330
1929–30	7·2	25·0	11·5	6·8	0·8	5·2	56·6	42	140	51	43	10	29	315
1930–31	2·4	38·2	5·6	3·2	0·3	1·8	51·5	13	150	20	15	4	9	212
1931–32	1·6	74·5	5·2	2·0	0·2	1·0	84·6	10	209	16	8	5	5	252

APPENDIX IV.

Chronicle of Chief Events in India since the War.

1919–20. Favourable monsoon. Unprecedented trade activity. Prices continued high. Rise in sterling value of rupee (reached maximum of *2s.* 10$\frac{9}{16}$*d.* on February 11th)—encouraged import trade. Shipments from the United Kingdom hampered by scarcity of tonnage and high freight rates.

1920–21. Partial failure of monsoon. Reaction after trade boom of previous year. Acute depression at end of 1920. Fall in rupee prices. Rapid fall in sterling value of rupee (from *2s.* 4$\frac{1}{8}$*d.* on 1st April, 1920, to *1s.* 2$\frac{15}{16}$*d.* on 7th March, 1921). Repudiation of contracts by Indian importers. Stagnation in market. Heavy imports of cotton spinning and weaving machinery, the fulfilment of orders placed in previous years. Non-co-operation movement started: boycott of foreign yarn and cloth and encouragement of "khaddar." General import tariff (including duty on piece goods) increased from 7½ per cent. to 11 per cent. *ad valorem.*

1921–22. Good monsoon. Unrelieved depression. Reduced purchasing power of masses as a result of relatively high prices of imported goods and depressed export trade. Instability of exchange. Energetic picketing as part of boycott campaign. 5 per cent. duty on imported cotton yarn. Heavy imports of cotton machinery.

1922–23. Monsoon well distributed. Export trade improved; imports remained stagnant. Improved purchasing power of masses. Sterling steady at *1s.* 4*d.* Boycott movement weakening. Fiscal Commission Report (July, 1922). Government accept policy of "discriminating protection" (February, 1923).

1923–24. Favourable monsoon. Good harvest, third in succession. High prices of imported articles checked demand. Disparity between low prices for agricultural products and high prices of manufactured goods. Export trade improved. Considerable fluctuations in exchange. Political conditions were more settled. Tariff Board appointed (July, 1923). Depression in Bombay cotton mill industry set in.

1924–25. Good monsoon for fourth year in succession. Continued expansion of export trade. Improvement in import trade; high prices of imported articles checked rapid expansion. Sterling value of rupee rose to *1s.* 6*d.* (*circa*). Improvement in political situation and subsidence of agitation. Depression in cotton industry more acute. Very heavy imports of yarn from Japan. Bombay mills appeal to Government for abolition of excise duty and for protection against Japan.

1925–26. Fair monsoon. Improvement in trade continued, but imports, unlike exports, had far from recovered to pre-war level. Exchange at about 1*s.* 6*d.* Fall in price of raw cotton led to cautious buying. Excise duty on cotton goods suspended (December, 1925) and abolished (March, 1926).

1926–27. Fair monsoon. Trade was fairly good. Fixation of exchange rate at 1*s.* 6*d.* (Indian Currency Act, March 1927). General political situation improved apart from Hindu-Moslem riots. Raw cotton prices continued to fall. Steady fall in price of cotton goods together with communal disturbances prevented revival of piece goods trade which had been expected after years of agricultural prosperity. Stocks accumulated. Restrictions on trading enforced by Marwari Chamber of Commerce, Calcutta. Depression in Bombay cotton industry continued. Tariff Board appointed to enquire into cotton industry (June, 1926).

1927–28. Good monsoon. Marked improvement in economic conditions. Communal tension remained acute. Boycott of British goods had little effect. Fall in prices of piece goods continued. Bombay cotton mill industry continued depressed. Heavy imports of Chinese yarn. Import duty on cotton yarn modified to 5 per cent. or 1½ as. per lb. whichever was higher. [Indian Tariff (Cotton Yarn Amendment) Act, 1927.]

1928–29. Deficient monsoon. Harvests fairly good. Buying capacity of ryot reduced. General improvement in trade. Renewal of boycott agitation (March, 1929). Protracted mill strike in Bombay (April to October, 1928). Embargo of Marwari Chamber of Commerce, Calcutta, on imports of white goods in certain months. General state of uncertainty.

1929–30. Good monsoon. Year opened with promise, but the general wave of world depression seriously affected India. Phenomenal fall in prices. Decline in import and export trade. Boycott agitation was mild for first half of year. Congress decided on civil disobedience and boycott (December, 1929). General strike declared in Bombay (April, 1929): Government appointed Court of Enquiry under the new Trade Disputes Act; strike collapsed. Heavy fall in raw cotton prices. Marwari Chamber of Commerce, Calcutta, placed embargo on imports of greys and whites in April, May and September, 1929, and upon imports of whites in October, 1929. Import duty on cotton piece goods raised from 11 per cent. to 15 per cent. *ad valorem* (Indian Finance Act, 1930). Protective duty on imported cotton piece goods (British, 15 per cent.; foreign 20 per cent. *ad valorem*) with a minimum specific duty of 3½ as. a lb. on plain grey goods (Cotton Textile Industry (Protection) Act, 1930).

1930–31. Favourable monsoon. Acute depression. Heavy fall in prices. Decline in import and export trade. Boycott campaign very active; violent picketing. No business at foreign cloth markets of Bombay and Calcutta. Embargo of Marwari Chamber of Commerce extended to transactions in April and May, 1930; Chamber resolved not to enter into fresh contracts for the period, May to December, 1930. "Irwin-Gandhi" Pact (March, 1931). 5 per cent. surcharge on imported cotton piece goods (Indian Finance Act, 1931).

APPENDIX V.

Glossary of Indian Terms.

Chaddar. A wrap or bed-covering. A grey or bleached cloth with coloured borders and headings, shorter but wider than *dhutis*.

Crore. Ten million. Usually applied to currency, *e.g.* a crore of rupees.

Dhuti or *Dhooti.* A loin-cloth worn by men, chiefly in Bengal, north-east and northern India. It is a light soft cloth, generally in the grey state but sometimes bleached, with a coloured (occasionally a bleached) border and heading.

Hartal. General stoppage of work and the closing of shops, etc., as an act of "mourning."

Khaddar. Cloth woven on handlooms from hand-spun yarn. The mills also produce a coarse fabric woven from the lowest counts of yarn to which this term is applicable.

Lakh. One hundred thousand. Usually applied to currency, *e.g.* a lakh of rupees.

Loongi or *Lungi.* A tubular form of skirt worn by men and women in Burma and by Mahommedan men in Eastern Bengal. It is a coloured cloth either checked, striped or plain.

Ryot. Peasant or cultivator.

Sari. A woman's garment worn wound round the waist to form a skirt and then draped over the head and shoulders. The grey or bleached sari is similar to the dhuti, but has a wider border. The coloured sari is made in a large variety of designs and colours.

DISCUSSION ON MR. BURNETT-HURST'S PAPER.

SIR BASIL BLACKETT, K.B.E.: It is with very great pleasure that I rise to move a vote of thanks to Mr. Burnett-Hurst for his very interesting and illuminating paper. I think that this is the first occasion upon which Mr. Burnett-Hurst has actually read a paper to the Royal Statistical Society, although he has been concerned in the preparation of more than one, and I hope that this will by no means be the last with which he will favour us.

The picture that Mr. Burnett-Hurst has put before us is not very favourable from the Lancashire point of view. I think that he has done a very real service in bringing the brutal facts plainly before the country and before Lancashire. I do not know whether the paper will be popular reading in Lancashire, but I hope it will be read and studied. The picture is of one of the greatest export trades in the world—that of Lancashire cotton goods—and as far as India is concerned, it is gradually being eaten into not only by the domestic production of India, but also by other competitors, first and foremost Japan, and, more recently, China.

What are the causes of this great decline in Lancashire's trade with India? Of course there have been some causes, due to the war, which may not be permanent. There is the very important question of the purchasing power of the Indian masses. Undoubtedly it is the purchasing power of the Indian masses which must always be the dominant question when the subject under discussion is the export trade of Lancashire, or of any other country, to India, and this has been cut into from time to time by catastrophes and tribulations during the last ten or fifteen years in a special way, and on the whole it has been an unsatisfactory fifteen years from the point of view of the masses. The worst feature has been the big gap between the prices of primary and secondary products. During the whole of the last ten or twelve years the prices of manufactured goods imported into India, particularly from this country, have been relatively much higher, compared with pre-war times, than prices of the primary products which the Indian producer is hoping to rely upon in order to exchange them for cotton goods. Something will have to be done before long to secure a restoration of equilibrium between primary and secondary products if the trade of the world as a whole and the prosperity of India are to recover at all. We in this country are suffering from the fact that prices for the goods we have exported have been too high, and prices of the primary products imported have been too low; in India there is a corresponding reduction in the purchasing power of the people. It is not only the spread between primary and secondary products and difficulties of that sort that have cut into Lancashire's trade; it has been brought out very clearly in the paper that the trouble has been due to the inability of Lancashire to compete at competitive prices. In so far as India has been protected by fiscal legislation there is perhaps some excuse, but it is apparent from figures put before us by Mr. Burnett-Hurst that while Lancashire has been cut into again and again by Indian production and by the protective duties of various sorts that have been imposed, Japan has managed all the time to compete successfully in spite of protection in India.

There is of course everything to be said, from the point of view of India, for building up a thoroughly satisfactory and efficient cotton industry there.

I do not think Mr. Burnett-Hurst mentioned one rather important feature that has contributed to the growth of Indian production and the cutting out of Lancashire, and that is the fact that whereas in 1913–14 Bombay and Ahmedabad contained the whole of the cotton mills of India, nowadays a large number of up-country mills are actively producing, and they are protected by the long railway freight operating not only against Lancashire, but also against Bombay and Ahmedabad. It is one of the ironies of the situation that the boycott movement, which was welcomed by Bombay and Ahmedabad, has probably done as much harm to Bombay and its competition with Ahmedabad and Upper India as it has done to Lancashire. The Bombay people have been very shortsighted in their attitude towards the boycott; they have been cutting off their own noses to spite their faces.

The question we are up against, and which Mr. Burnett-Hurst puts before us, is really this: Can Lancashire recover her position in India, or even a satisfactory position—a reasonable share of the Indian market? It is a question of very great interest to Lancashire, and one that really ought to be answered at once in order that the reconstruction of Lancashire industry which is slowly going on, and which is absolutely essential if she is to recover her place in the world, can proceed. The question must be answered whether she is to plan with a view to a large export to India, and what class of goods she can hope to export. Mr. Burnett-Hurst does not give us very much hope; his conclusions, so far as I can see, are that a big recovery, even a retention of her present very much reduced trade in India, is dependent on very much greater competitive power in India.

I shall no doubt be challenging a great deal of opposition if I express my view that the fundamental trouble is the obstinate individualism and conservatism of the Lancashire employer and the Lancashire operative. Japan has got her place in India by the fact that she has all the branches of her industry working together in effective co-operation.

Mr. Ellinger read a paper here about two or three years ago which was interesting and illuminating. In Lancashire to-day efforts are being made and will no doubt succeed, up to a point, to re-organize the cotton industry on a more co-operative basis. The attitude of Lancashire towards the Lancashire Cotton Corporation is very illustrative of the difficulties that any attempt to reorganize there has to meet. You can hardly hear a good word for the Corporation anywhere in Lancashire. The fact that it has made a loss in its first two years of work—which anyone could have foretold it was bound to do if it was to do its work properly—is given as a reason for regarding it as a wash-out. I believe the future of Lancashire depends largely upon the success of the Lancashire Cotton Corporation, and the willingness of other manufacturers in Lancashire to see the kernel of the question of competitive prices in the effort to secure effective co-operation in all branches and the effort to replace the individualism, which no doubt served Lancashire well in the nineteenth century, by a really co-operative organization in order to deal with her problem in the twentieth century.

I have much pleasure in proposing a vote of thanks to Mr. Burnett-Hurst for his paper.

PROFESSOR HENRY CLAY: It gives me great pleasure to second the vote of thanks to Mr. Burnett-Hurst for his paper. One of the advantages the Society enjoys is the opportunity of calling upon members who have knowledge and experience of other parts of the Empire to contribute to its transactions. Mr. Burnett-Hurst has taken the largest market of what was the biggest competitive export trade, has examined both the British and Indian trade returns bearing on it, and has given us this lucid digest of the results. I am not able to criticize any of the figures, and I do not wish to suggest anything on method; all I propose to do is to discuss certain of the results. If you take this particular trade of Lancashire and India and study it comparatively, you find an experience, a falling off, which is much worse than that of British industry as a whole. It is the explanation of that difference that I want to discuss.

Sir Basil Blackett has given the fundamental reason in the divergence of prices of primary and secondary products of Indian exports and imports. He has dealt also with some of the other important causes. I want to take the inferences indicated by the statistics and examine them. In the first place, it will be useful to supplement Mr. Burnett-Hurst's first section by looking in slightly more detail at the pre-war period from which the comparison was drawn. 1913–14 was a bad year to take for this comparison, because British imports into India increased by 50 per cent. between 1909 and 1913. That increase of 50 per cent., again, is a little misleading, because 1909 was also a bad year for purposes of comparison; our exports were lower than they had been in the first quinquennium of the century. In the period 1901–13 our exports to India increased by 38 per cent. It was a period of general expansion of the cotton industry in all directions. It was most unfortunate for the post-war industry that the expansion was so great, for I think one would have to go far back into the history of the industry to find such a growth as there was in the fourteen or fifteen years before the war, and particularly such a growth in exports.

In looking at these figures I found it also of interest to look at the exports of the different categories of active exports. Taking a rather long period, 1890–94, and comparing it with 1911–13, I found that our exports of grey cloth had actually declined. The whole of the enormous increase had been in the various categories of finished goods. The export of bleached goods had increased by 52 per cent., of prints by 32 per cent., and of dyed goods by 123 per cent. Rather more than half of the increase in each case had taken place in the ten years preceding 1910–13. That is significant, because the relatively smaller decline in our export of finished textiles was used before the Government Committee of Inquiry into the cotton industry as an answer to the allegation that finishing charges had contributed to the decline in exports and was accepted by them. In the light of these figures it is clear that the whole of the increase in our exports, taking a long trend, was in finished goods, and that a smaller relative decline in export of finished goods might represent a bigger departure from the trend than a larger decline in exports of grey cloth.

In the second place, I think it is convenient to draw a distinction between the decline up to 1928 and since then. Up to 1928, although we had lost something over 40 per cent. of our trade to India, India was not markedly distinguished from other export markets; since then the decline has been much greater. Moreover, up to 1928 we were feeling the influence of Japanese competition, but we were losing ground only slowly. The average monthly imports of cotton piece goods from the United Kingdom and Japan respectively in 1928 were 122 and 25 million yards, which in both cases was a smaller figure than 1927, but bigger than 1924 and 1925. Since then there has been a much bigger proportionate drop in our exports to India, which is obviously due to the raising of the Indian protective duty in 1929 and to the boycott.

In the third place, I think it is interesting to compare our exports to India with our exports to other markets. We find that the decline has been greatest in all Eastern markets, but much greater proportionately in China and Hong-Kong than in India. It has also been great in other Far Eastern markets, particularly the Dutch East Indies. These cases go to support the conclusion drawn by Mr. Burnett-Hurst, that the explanation of the decline in our export trade is two-fold—on the one hand, Japanese competition, and on the other hand, Indian mill competition. Japanese competition must be an important influence, and one must infer that it is so not only from the gains made by Japan in India, but from the even greater gains Japan has made on the other Far Eastern markets, and recently in the African market. On the other hand, other Far Eastern exporters have not made great gains upon us.

The Japanese gain is due to the influence to which both Mr. Burnett-Hurst and Sir Basil Blackett referred, and also Mr. Ellinger in the paper he read to the Society. There is another influence that should be mentioned, namely that Japanese export is only half Japanese production; the other half is production for the home market, and is dominated by the large combines which conduct the export trade. The Japanese consumer is made to stand a part of the loss which the Japanese exporter incurs when he sets out to establish himself in a competitive market. Japan is a competitor on price. What the Japanese have done is to offer an inferior production at a disproportionately lower price, and India has been induced to substitute something which is not so good as she has been getting from Lancashire, but which is so much cheaper that she does not mind.

The problem of Lancashire is difficult. Mr. Burnett-Hurst spoke of "manufacturers" getting their prices down; the manufacturers themselves have no direct contact with the market. There is little integration between exporting interest and manufacturing interest, and this is one of the chief reasons of Lancashire's loss.

I would deprecate undue criticism of the Lancashire cotton industry, because, although it has many sins of omission or commission upon its head, it was in a unique position. Before the war it exported four-fifths of its output and did over 70 per cent. of the world's export. The war was bound to hit it adversely, and the Indian Government's protective measures have simply destroyed its largest market. With the present low price of cotton the import duty is over 40 per cent., far more than the total manufacturing cost of the cloth. The duty was imposed for reasons of revenue; its effect has been to reduce the revenue which the Indian Government derives from the cotton duties by a half. The influence of the boycott has been decisive in the case of manufacturers who had got their prices down and who then found that the boycott was directed more particularly against British imported cloths. For these reasons the industry is in a particularly difficult position. I think it should be remembered that when our Government granted fiscal autonomy to India, as personally I think they were bound to do, they put permanently out of employment about one quarter of the operatives in Lancashire.

MR. BARNARD ELLINGER said he would like to support the appreciation of the paper offered by Sir Basil Blackett and by Professor Clay, but he would ask the Society not to run away with the idea that as little work had been done on these Indian figures as might be thought from the opening paragraph of Mr. Burnett-Hurst's paper. A very large amount of most useful information had been collected and was being collected by the Cotton Trade Statistical Bureau, and this reproach should not be added to those criticisms to which the cotton trade was already exposed. The trade in Lancashire criticized itself, and welcomed criticism from London, because it felt that its problem was not merely a Lancashire problem, but a national one. It was no good going to the leaders of the industry in Lancashire and asking them to settle all and every trouble; one trouble was that although there were leaders, there were no followers. One of the problems of Lancashire was that there were 250,000 unemployed people scattered over hundreds of small towns and villages, and that was a problem which could not be settled entirely without national help.

Another reason why the depression in the cotton industry was a national problem was because the trade played an enormous part in the national balance of payments. Even if the balance of trade could be rectified to any extent by means adopted by the statesmen at Westminster, a great deal more would be done, and a balance would be arrived at much more quickly, if the cotton trade were looked after. He said this, not because Lancashire did not welcome criticism from London; on the contrary, she did. Up to a short time ago, however, the criticism was accompanied by offers of money to put the house in order; now, the criticism persisted but the money seemed to be receding into the distance.

Mr. Burnett-Hurst had stated that, "In India the statistics of both production and imports of yarn are recorded according to the counts, but there is no exact method of measuring qualitative differences in piece goods." This, however, was also the case in this country. He (the speaker) had attempted to find out if there had been any substantial alteration in the quality of Lancashire goods shipped since the war, and by methods which he would not care to be obliged to justify before the Royal Statistical Society he had jumped to the conclusion that there probably was not any great change. He did believe that very vital information on this matter was missing, and if the Board of Trade could put their heads together with the cotton trade and, particularly, with the Statistical Bureau, some means might be found of estimating alterations in the quality of the goods which we exported.

In regard to the question of the disparity between the prices of primary products and manufactured goods, as wages fell more slowly than prices, it seemed to him that the disparity must go on increasing so long as the general level of prices was falling, and it was only when the general level of prices began to rise that it could gradually disappear.

If, owing to monetary causes, the general level of prices was being forced down, something must give way, and if the wages of manufacturing goods remained rigid, the result was that the fall in primary products must be greater than that which was caused by redundant production.

Mr. Ellinger thought Sir Basil Blackett was wrong in saying that the Lancashire Cotton Corporation had no friends in Lancashire. The critics were very vocal, but thinking people in Lancashire recognized that the Lancashire Cotton Corporation represented the one tangible move in the right direction that had yet taken place. All the textile combines in the last century which had been successful had taken five years to put their houses in order, although they had not started during the worst period of depression the world had ever seen. The Lancashire Cotton Corporation must be given even longer, therefore, than the earlier amalgamations had required.

But even the friends of the Corporation wanted to know if it had lost money and, if so, how it had been lost. Was it merely in competing with the hundreds of units already existing for the trade which was there, or had the loss been incurred in recapturing some old markets or creating new ones? If the latter was the explanation he believed that all their sins would be forgiven them; otherwise they would only have added one more competitor to the number that already existed.

Lancashire could never hope to compete with India against the 25 per cent. tariff; there was no possible reduction in producing costs that would enable this to be done, and even if it could be done India would put on another 25 per cent. tariff. India had as much right to put on any tariff she believed to be in her interest as Great Britain had to put on tariffs against her. All that could be hoped was that at the Round Table Conference at Ottawa it would be pointed out that Great Britain imported a great many goods from India and some understanding might be arrived at to our mutual advantage either in respect of direct trade or of triangular trade between the United Kingdom, India, and other parts of the Empire.

To what extent was the future development of the Indian mills to be at the expense of the hand-looms in India? At present there was intensive agitation to increase the production of hand-looms, but in no country could a great power-loom industry exist beside a hand-loom industry. In Japan, as the number of power looms increased, the hand-looms went down, and probably the same thing would be seen in India and in China.

The recent competition from China was due to the fall in the value of the tael, but in regard to Japan, the Japanese trade as a whole—not the spinners—had lost money as Lancashire had lost money; the difference was that, while they had lost their money they had kept their people employed and built up connections by capturing markets, and they would benefit as trade improved.

Lancashire had lost money, lost markets and connections, had paid out at least fifteen millions sterling since 1924 to unemployed operatives, and was in a poor position, compared with Japan, to benefit from any increase from world demand.

PROFESSOR STANLEY JEVONS agreed that the Society was greatly indebted to Mr. Burnett-Hurst for having prepared such a careful survey of the trade in piece goods with India. It would be most useful to any person who in future took up the subject.

He expressed slight disappointment, because on first looking at the title of the proposed paper, "Lancashire and the Indian Market," he had thought Mr. Burnett-Hurst was going to deal with other aspects of trade between Lancashire and India. It should not be forgotten that Lancashire exported many other things besides cotton piece goods to India—machinery being the principal—and there was a slight set-off to the loss of exports in the cotton trade in the fact that Lancashire had been equipping so many of the Indian mills. There were also many miscellaneous engineering products and large quantities of mill stores which came from Lancashire, and these must make up a considerable total.

There was another aspect of the trade between Lancashire and India worthy of consideration. In the past it certainly had not been of a reciprocal character. About a year ago a great deal was said about the desirability of balancing the trade between two countries. That was because Great Britain bought much more from the Argentine Republic than they did from Great Britain. Hitherto India had been expected to buy a good deal more from Lancashire than Lancashire bought from India. It was satisfactory to find that this was being rectified by the fact that considerably more Indian cotton was being used in Lancashire, also that Lancashire did import an increasing quantity of oil seeds and beans, which went to Liverpool and were distributed to various works in the North of England.

With reference to the causes of the falling demand for British piece goods in India, Mr. Burnett-Hurst had undoubtedly given the main reasons, but there were one or two other little reasons which it was interesting to note. One of these was the change of fashion. Before the war it was customary for almost all Europeans out in India to wear white drill, and many Indians as well as Anglo-Indians followed this fashion. Since the war the Europeans had abandoned this uncomfortable practice of wearing tightly woven cotton goods, and wore American palm-beach, or cheaper substitutes from Scotland. The Indian also had ceased to follow the European, and wore, very sensibly, his own home-woven stuff. Part of the reason for the growing use of Indian native cloths was their greater comfort. Tightly woven Lancashire cloths were uncomfortable in a hot, moist climate, and when an Indian also gained prestige by wearing a home product, this change was likely to increase. Another interesting point was that soap was being used more and more in India since the War, and many factories for soap manufacture had been set up. This meant that the *dhobi* (washerman) no longer hammered the clothes on stone slabs, and so they lasted longer.

There were other interesting points, but one to which he would like to refer was the following. There was a tendency all over the world for industries to move to the source of the raw materials if the market was not too far away. The case of the cotton industry was only a part of a very general movement. For this reason, it was likely that cotton manufacture would go more and more to India as the Indian long-staple cotton was grown more and more in the Punjab and other parts of India. The tendency would be to rob more and more of this trade from Lancashire, quite apart from tariffs. It seemed that the main hope for Lancashire was in new technical developments in the finishing trades, for there it was impossible for other countries, especially India, to compete with Lancashire. The Textile Exhibition held at the White City was very promising, and showed what Lancashire could do when it set itself to produce new fabrics with a beautiful finish. If Lancashire manufacturers would study the possibilities of demand in India more closely, they might considerably develop existing lines, and obtain additional business in new fabrics.

CAPTAIN RYAN congratulated Mr. Burnett-Hurst on his paper, in which he had collected together in a valuable form the essential statistics of this most interesting and important problem. The dependency of Lancashire upon the Indian market had been stressed with the emphasis it warranted, and the question of the future had been presented. He himself had come to the meeting expecting to enjoy the paper, which he had done, but he had not expected to hear any pleasant things said about the Lancashire Cotton Corporation, and he felt he could not let the opportunity pass without saying how much he appreciated them. He almost forgot the last time when he had heard any appreciation offered.

There were several points he would like to make in connection with the problem. The lecturer had followed other authorities in stressing the fact that the Indian cultivator, receiving small prices for his products, had been in a worse position to buy. That seemed a perfectly sound theoretical argument, but was not justified by figures. From all the figures he had been able to collect together, he believed the quantity of retained production of cotton yarn, *i.e.* home production, plus imports and less exports, showed a tendency to increase, and the fact was that the Indian market had increased and that Lancashire had gone backwards, not in a reduced, but in an increasing market, so that, if anything, the position of Lancashire had become much worse than appeared from the figures which had been pointed out.

Secondly, the author of the paper had stressed the tendency in India to spin finer counts. There again the tendency was not as great as the figures appeared to show. Whenever imports of American and Egyptian cotton were quoted as being evidence that this was the case, they must be viewed with a great deal of doubt for two reasons. First of all, Bombay acted as a port of import and export for these cottons, and it was only necessary to look at the figures of Uganda cotton, of which the imports to Bombay formed a large proportion, and to find that Japan bought much of her supply of Uganda cotton from Bombay, to realise that all that went into India was not for Indian consumption. A great deal of the American cotton imported in 1926 for India (and when the figures foı 1932 were published the same tendency would be shown) was bought because of its relative cheapness and not because of its superior spinning qualities. A large proportion of the mill spindles were put down in India to supply China with yarn, but India had lost that trade to Japan, and in order to keep her spindles working, the mills put down power looms. These were put down not so much to supply the home market, as to use up the yarn produced by the spinning mills.

Mr. Burnett-Hurst had suggested that Lancashire's yarn trade with India had gone for ever. Captain Ryan would have been inclined to agree with him six months ago, but to-day he would say the only thing that prevented Lancashire from producing more yarn for India was the impossibility of finding sufficient trained operatives to do the work. That situation had only come in the last three or four weeks, during which time extraordinary demands had been received for bundle yarns, such as had been almost forgotten, and it was proving exceedingly difficult to find reelers. This demand was primarily because the Shanghai mills were closed down. It was difficult to understand why this trade had not gone to Japan; one would have thought India would have turned to Japan for this yarn rather than to Lancashire, but the fact remained that the trade had come, and one was led to believe that it showed signs of being retained. That raised an important problem. Lancashire was faced with the opportunity of taking on again one of her old trades, and the organization was not there to handle it efficiently. Lancashire, as producer, was divorced from the actual purchasers, and it was almost impossible for manufacturers to know what measures they could take to keep this trade now that it had come. The same thing applied to a certain extent to the piece goods, but in that direction there was another consideration to which he would like to refer. The Lancashire Cotton Corporation, by direct competition with the Japanese, and by making the coarser cloths which had been substituted for the old British piece goods, had successfully placed her new productions in many markets, but up to date she had failed to make any satisfactory progress in India. She could not obtain a price worth while, or anything like that at which the same cloth could be sold in other countries. It appeared that the Japanese had used the Indian market to place their surplus goods at a price under the cost of production. Certain cases had been analyzed, where the raw cotton alone would have cost more than the completed article. It was difficult to know how to compete in such cases. The figures were conflicting, and it was not easy to get hold of the necessary data, but cases had been investigated where Japanese goods were selling in bazaars at prices that would not cover the cost of the raw material.

The speaker did not think that Lancashire could look with any great hope upon expansion of the Indian market unless some very different state of affairs occurred. They had arrived at a state of feeling that whatever efforts were made would be countered by a high tariff wall, and a feeling that it was not worth doing.

There was one direction in which not only Lancashire could be benefited, but that reciprocal trade to which reference had been made could be obtained, and that was by India placing an export tariff on raw cotton with a preference for Great Britain. If India made Japan pay more for raw materials, she would not only make revenue for herself, but she also would help Great Britain to re-establish her trade with other markets. Such a procedure would give benefit to both countries.

MR. H. A. F. LINDSAY congratulated Mr. Burnett-Hurst upon the paper, which had been appreciated by all, and particularly by himself, as he felt that the investigations had been started from the right point, the Indian bazaar. When the matter was considered from the point of view of the Indian bazaar, one came across one or two factors which had an enormous bearing upon the whole situation in India. India had always been a price market, and Lancashire had always treated the Indian market on that basis. Concurrently with that price factor there was the enormous specialization which Manchester realized to be a vital factor in the Indian market. The Indian tailor used to say to a customer, "Here is the *dhuti* you require; no one else in the bazaar sells one like it." Nowadays he said, "This is the thing to wear because everyone is wearing it." The change over from the distinctive *dhuti* with a monopoly pattern to the plain, standardized *dhuti*, was really the crux and explanation of the change-over from the highly specialized cloth to the highly standardized cloth. Mr. Lindsay said he would like to congratulate the Lancashire Cotton Corporation on having realized the importance of standardization. He would also like to say one word in slight criticism of Mr. Burnett-Hurst. It really was most important when estimating the consumption of cotton goods in India to take the hand-loom production into account. After considerable difficulty, official statistics had been published which illustrated the hand-loom trade, and they showed the position more accurately and more clearly than before. The consumption of cotton piece goods before the war had been 5000 million yards, made up as follows:—

3000	million yards	Imported.
1000	,, ,,	Hand-loom.
1000	,, ,,	Indian mill.

The position to-day was almost exactly the reverse :—

1000	million yards	Imported.
3000	,, ,,	Indian mill.
1400	,, ,,	Hand-loom.

When the growth of population was taken into account, this worked out at just a little short of the pre-war per caput consumption of the whole of India, which was 16¼ yards per caput before the war and 16 yards now. To get back to the pre-war consumption it would be necessary to supply 5750 million yards. Since the war, the Indian mills had captured 2000 million yards of that market, and the hand looms had been able to capture 400 million yards. That gave an illustration of the hand-loom working successfully side by side with the power-loom, and not put out of action by the power-loom, as one of the previous speakers had suggested.

Mr. Lindsay wished to endorse what Sir Basil Blackett had said about the gap between the prices of manufactures and raw materials. Great care had been taken in India to trace those developments, and some extraordinarily interesting discoveries had been made. The "manufactures" prices rose more rapidly than those of raw materials; they also declined more quickly, but as the two lines drew together again there was occasionally a violent reaction, either raw material prices sinking disproportionately or "manufactures" prices rising. This point where the two leapt apart came with the greatest regularity every three years. It was impossible to explain why it happened; all one could say was that it did happen. The last occasion was in 1929–30. The margin between the two was now about 10 per cent. Mr. Lindsay did not regard it as likely that the gap between prices of raw materials and of manufactured goods would last for ever; it had contracted from a maximum of nearly 100 in 1920–1 to only 10 to-day.

Sir Josiah Stamp thought the discussion had been extremely valuable, and expressed his thanks to Mr. Burnett-Hurst for having provided the opportunity for such a discussion. By this contribution of his he had made a present to Lancashire which would be of great value to the country as a whole. Whether it would make him popular in Lancashire was another matter. The picture was one of unrelieved gloom, and he could not help thinking that Mr. Burnett-Hurst in Lancashire was in the position of the Judge with the nigger whom he was just about to condemn on a capital charge, when the prisoner said, "This sure am going to be a great lesson to me." It looked as if the lesson had come too late. Captain Ryan, however, had given some ground for hope, particularly if the three-year principle was to hold good.

After the meeting the following contribution was received from Mr. T. W. Wyatt :—

This interesting paper provoked an interesting discussion, but a summing up of the whole situation seems desirable. Lancashire has lost the pre-eminent position she held in the Indian Market, but the conditions which enabled her to attain that position have entirely changed. Apart from Japanese competition, there is the justifiable desire of India to supply her own needs in textiles as much as possible, and even if Lancashire were able to lower her prices by some means, there is no doubt, if Indian mills became unable to compete, the Indian tariff would be raised. In the past, India apparently purchased more than she sold; it would be interesting to know how the balance of trade was adjusted, and whether it was made up by loans to India from England.

It was brought out in the paper that the purchasing power of the masses in India was an important factor, and, given that the Lancashire trade of the past cannot be restored in view of changed conditions, it would be well worth while for Great Britain to study how the purchasing power of the masses, not only in India, but in the other parts of the world which were more or less controlled by us, could be increased in order to provide a market for the more technical or better-class goods which Lancashire and other parts of Great Britain could supply.

In the discussion, means by which Japanese competition could be countered were put forward, but while it is obviously essential that our technical efficiency and competitive power should not be allowed to decline, at the same time a policy of merely intensifying competition for a restricted market must inevitably create international friction.

This adds force to the suggestion given above that a rise in the standard of living would be the best means of absorbing our products, and if this were done it might well be to our advantage to leave to Japan that portion of the market which the stage of technique she has at present attained would enable her to supply.

Mr. Burnett-Hurst: I thank you very much indeed for the manner in which you have received my paper. In view of the lateness of the hour, I regret I cannot reply now, much as I should like to do so. I shall deal in the *Journal* with the points raised in the discussion.

Mr. Burnett-Hurst's written reply was as follows :—

For the benefit of the reader I am dealing with the principal points that were raised in the discussion in the order in which they came.

I am glad that Sir Basil Blackett referred to the growing importance of the up-country mills in India. There is no doubt that among the factors which have contributed to the remarkable expansion of the up-country industry are the political and labour troubles in Bombay and the railway freight handicaps to which Bombay, Ahmedabad and Lancashire goods are subject. I also agree with Sir Basil Blackett that the central question at issue is whether Lancashire can recover her pre-war position. The concluding paragraphs of the paper clearly show that the answer to the question is in the negative. It is doubtful whether Lancashire will even hold her present share of the Indian trade, let alone increase it. Much will depend upon the support accorded to the Lancashire Cotton Corporation in its efforts at reorganization.

In referring to the comparisons with the pre-war period, Professor Clay stated that "1913–14 was a bad year to take for this comparison." A closer study of the paper will, however, show that the quinquennial average (1909–10 to 1913–14), *not* the year 1913–14, was selected as the basis for comparison. Professor Clay proceeded to compare exports for 1890–94 with those of 1911–13. In order to avoid making the paper too wide in its scope, I confined it to the trade "*immediately before*, during and after the war," as stated in the opening paragraphs of the paper. The inclusion of statistics for 1890–94 could easily have been made; so could similar quinquennial averages have been inserted for the 'eighties, 'seventies, etc. A self-imposed limit has to be made and its choice is a matter of opinion. Nevertheless, the figures given by Professor Clay form an interesting supplement.

I regret that Mr. Ellinger should form the opinion from the opening paragraphs of my paper that I do not appreciate the useful service which the Cotton Trade Statistical Bureau is performing. I am well aware of the amount of valuable material it has collected for its members. Unfortunately, most of this information is strictly private and confidential for use by its members only and is not available for use by the general public. Mr. Ellinger interprets too narrowly the reference which I made to the absence of an exact method of measuring qualitative differences in piece goods in India. I am aware that this is the case not only in this country but all countries. I was, however, confining my remarks to the shortcomings of Indian statistics.

Mr. Jevons paid me a compliment when he concluded from the title of the paper that I proposed to deal with various aspects of trade between Lancashire and India. I would remind him, however, that our official statistics do not enable trade to be measured between English *counties* and foreign *countries*. Mr. Jevons states that exports of cotton machinery serve as a slight set-off to the loss in exports of cotton goods. The Indian boycott is directed against not only British cotton goods but also British cotton machinery, with consequences that are revealed by the statistics in Appendix I, Table K. Mr. Jevons considers that two additional causes of the decreased demand for British piece goods are the change in fashion and the greater use of soap. With regard to the former, any substitution of American Palm-beach for white drills by Europeans and Anglo-Indians would have little effect upon the total demand of India for cotton goods. According to the latest available Census returns for 1931, there are only 320,000 Europeans and Anglo-Indians out of a total population of 352,800,000 persons. The number of educated Indians who have worn European attire is also fractional. Equally misleading are Mr. Jevons' remarks regarding the use of soap in India. Mr. Jevons asserts that "soap was being used more and more in India since the war and many factories for soap manufacture had been set up. This meant that the *dhobi* (washerman) no longer hammered the clothes on stone slabs, and so they lasted longer." I agree that factory pr of soap in India has increased since the war, but this arose decline in imports during and since the war. One m er, assume that this means greater use of soap in In trary, the increase in home production has been decline in imports. Imports of soap in 1931–32 were compared with 363,000 cwt. in 1913–14. Nearly twenty ago, Sir George Watt wrote in his standard work on the Com. Products of British India that "crude soap is largely manufactu and sold in every village to be employed by washermen and dyers, and yet the *dhobi's* stone was everywhere in use. The Indian *dhobi's* stone is the counterpart of the English housewife's washing or "scrubbing" board; soap therefore is not a substitute for the stone. Fortunately for producers of cotton and other fabrics, the *dhobi's* stone is as popular as ever.

I agree with Captain Ryan that part of the long staple cotton imported into India was re-exported. Nevertheless, the bulk of the imports were retained for Indian consumption. The Bombay Millowners' Association draw attention to the increase in the spinning of finer counts. Unfortunately, the official statistics are not published in sufficient detail to establish this fact in statistical form. Captain Ryan has drawn a wrong conclusion from the paper when he states that I suggest that Lancashire's yarn trade has gone for ever. On the contrary, I would refer him to my conclusions in the paragraphs that follow Table XII.

Mr. Lindsay criticizes me for omitting the production of the hand-loom industry. My reason for excluding these figures is that little value can be attached to them, as they are in the nature of very rough estimates.

With reference to Mr. Wyatt's suggestion that it would be worth while to study how the purchasing power of the masses can be increased, I fear that it would take many decades to raise the standard of living of the masses in India to such a level as would result in an increased demand for better-class goods which Great Britain could supply.

May I again express my grateful thanks for the very kind way in which my paper has been received.

As a result of the ballot taken during the meeting, Mr. Ronald Stuart Symons was unanimously elected a Fellow of the Society.

I. BY-PRODUCTS AND BY-PRODUCT INDUSTRIES.

By G. RONALD WHITE, B.A.

[Read before the Royal Statistical Society, April 19th, 1932,
the EX-PRESIDENT, MR. A. W. FLUX, C.B., in the Chair.]

Introduction.

DURING the past two years papers have been read before the Society dealing with three primary industries of this country, namely, coal, iron and steel, and cotton, while two other papers have been concerned with general industrial problems. The subject of this paper is neither a specific industry nor industry as a whole, but a group or network of industries. With a few notable exceptions the utilization and treatment of by-products is a comparatively recent aspect of industrial development. It would be quite impossible, however, in the course of a single paper adequately to deal with the subject of by-products and by-product industries in general, and in this paper I have confined my attention to those industries whose raw material is the by-product of the live-stock industry. In order, however, to avoid a cumbersome terminology these industries will be referred to simply as the by-product industries.

Cattle are reared primarily for beef or dairy produce, sheep for mutton and wool, pigs for pork, bacon and ham, and goats for milk or meat. Hides, skins, horns, hair, tallow, fat, edible and inedible offals are merely the by-products of the industry. An increase in the demand for hides does not add a single hide to the world's supply, although it may increase the quantity coming on to the world's market, while a falling off in the demand brings about no contraction in the supply, although hides which in a time of active demand and high prices would be collected from distant parts of Central Africa, Asia and South America are no longer marketed. On the other hand, if the demand for beef increases, stock-breeders are induced to extend their activities, more cattle are slaughtered and more hides produced, whether there is an increased industrial demand for them or not.

The infinite variety of manufactures utilizing the by-products of the live-stock industry includes the following:

From HIDES AND SKINS.

Leather; boots and shoes; saddlery and harness; leather gloves; fancy leather goods, such as pocket-books, purses, handbags, etc.; leather trunks, bags and cases; leather sports goods; machinery belting; sheepskin rugs; glue; gelatine.

From HAIR.

Upholstery; paint-brushes; felting and plast

,, WOOL (pulled from sheepskins).

Woollen goods; clothing; blankets; carpets; fabrics

,, HORNS.

Combs; knife and brush handles; buttons; pipe stems and washers.

,, BONES.

Tallow; glue; bone black.

,, FATS (inedible).

Tallow oil and tallow stearine; grease; lubricants and machine oil; candles; soaps; glycerine; cosmetics; leather dressings and textile finishings.

,, HORNS, BONES AND FATS.

Animal and poultry foods; fertilizer.

,, EDIBLE BY-PRODUCTS.

Tongues, kidneys, sweetbreads, etc.; sausage; lard; lard oil and stearine; margarine and confectionery (using fats and gelatine).

,, MISCELLANEOUS BY-PRODUCTS.

Pharmaceutical products; insulin; serum; albumen; pepsin; sausage casings; strings for musical instruments, etc.; surgical catgut; artists' colours; inks.

This list is by no means complete, and no attempt has been made to catalogue the many and varied uses into which some of the manufactures themselves enter. Glue, for example, is used in more than one hundred different products, while the uses of gelatine are almost as numerous. The utilization of many of the minor by-products has been more extensively developed in the United States than in this country, owing to the fact that in order to manufacture these products on a commercial scale the yield from thousands of animals is required. Certain American Packer establishments, for example, manufacture a large variety of pharmaceutical products from animal glands, membranes and other internal organs.

The degree to which live-stock by-products enter into the manufacture of the various products enumerated varies between very wide limits. In the case of leather the cost of the raw hide or skin may represent as much as 60 or 70 per cent. of the value of the leather, while for certain kinds of confectionery the cost of the gelatine (which is itself manufactured from hide and skin waste) may be less than 1 per cent. of the value of the finished product. Thus, while leather is undoubtedly a by-product industry, the confectionery trade could not justifiably be included under this category. In the subsequent analysis I shall only regard as by-product industries those industries which derive the major portion of their raw material from live-stock by-products or from manufactures of live-stock by-products.

It is convenient to divide this paper into two parts. In Part I I shall attempt to estimate the magnitude of the by-product industries in this country, utilizing the data obtained in the 1924 Census of Production. In Part II I discuss some factors relating to prices, supplies of and demand for live-stock by-products.

The question of the supplies of live-stock by-products is fundamentally concerned with the question of live-stock slaughter. In Part I it will be found necessary to use the estimates of slaughter in the United Kingdom made by the various agricultural departments, and in view of the importance of these estimates, not only as they affect the question of by-products, but also as the basis of the official estimates of meat supplies, I have considered them in some detail in an Appendix.

PART I. THE MAGNITUDE OF THE BY-PRODUCT INDUSTRIES.

The determination of the magnitude of the by-product industries in this country involves two distinct problems: (*a*) the total value of the output of the by-product industries and (*b*) the contribution of the by-product industries to the national income. Representing this algebraically:

if R_N = the value of the raw by-products of native origin,
R_I = the value of the imported raw and semi-manufactured by-products,
r = the value of all other raw and semi-manufactured materials used by the by-product industries,
V_N = the value added by manufacture to the native raw by-products,
V_I = the value added by manufacture to the imported raw by-products,

then (*a*) the total value of the output of the by-product industries

$$= R_N + R_I + r + V_N + V_I = O_T, \text{ say,}$$

and (*b*) the contribution of the by-product industries to the national income

$$= R_N + V_N + V_I = O_T - (R_I + r).$$

It is not possible to determine R_N with any degree of accuracy, but it will be useful to consider one or two facts regarding its order of magnitude.

The total value of the agricultural output in the United Kingdom as determined in 1925 in connection with the Census of Production was £289 million, of which £205 million represented live-stock produce. This figure includes milk and dairy produce valued at £94 million, while the remaining £111 million represented the value of live-stock sold off the farms for slaughter or consumed in farm households. This total, which includes the value of the hides, skins, offal and other by-products, is made up as follows:

Table I.

Value of Live-Stock Sold off Farms or Consumed in Farm Households, 1924–5.

£(000).

	England and Wales.	Scotland.	Northern Ireland.	Total U.K.
Cattle	31,290	16,300	3,496	51,086
Calves	3,370	250		3,620
Sheep and Lambs	16,270	8,250	595	25,115
Pigs	26,790	1,450	1,399	29,639
Total *	78,970	26,430	5,490	110,890

* Including horses.

The question of the actual value of the by-products in the form in which they are first obtained after the slaughter of the animals is one which has been given very little attention in the past. Even in the United States, where some of the larger meat-packers run their own tanneries, glue factories, lard refineries, soap factories and so on, there is a surprising lack of information on this point. The Federal Trade Commission of the U.S.A. carried out an exhaustive enquiry into the organization, methods and practices of the meat-packing industry about thirteen years ago, and their report occupied six volumes. Although frequent reference is made in these volumes to the question of by-products, no attempt is made by the Commission to estimate the relative importance of the by-products or the industries depending on them. In the course of a statement made to the Commission by one of the largest packing establishments it was stated that the cost of live cattle purchased by the firm in

1916 was \$120·3 million, while the value of the hides from these was \$18·8 million and the value of other by-products \$13·6 million. The total value of by-products in this case would appear to be 27 per cent. of the cost of the cattle. Another of the packers stated that the cost per head of live cattle in 1918 was \$92·70, while the amount received per head for by-products was \$22·06, or nearly 24 per cent. of the cost price of the animal. In neither of these estimates did the packer state explicitly that the amounts credited for by-products referred to their condition immediately after the slaughter of the animal. In addition, both estimates refer to war years, when the relation between prices of different commodities was abnormal. A more generally accepted figure in the United States is one which has been quoted by the Ministry of Agriculture in a report on the marketing of cattle and beef in England and Wales. This places the value of the raw by-products of cattle at about one-sixth of the total value of the beef. In a later report published by the Ministry on the marketing of sheep, mutton and lamb, the edible offals of home-produced sheep and lambs were estimated at 10 per cent. of the total value of the mutton and lamb produced.

It is possible to make certain estimates for the value of the hides and skins derived from live-stock in this country. In the absence of any official statistics of slaughterings the Ministry of Agriculture makes an annual estimate of the slaughter of cattle, calves, sheep and lambs and pigs in England and Wales, utilizing the live-stock census figures relating to the beginning of June each year. The Board of Agriculture for Scotland made similar estimates for that country in its report on the agricultural output in 1925, but the Board does not appear to have published these figures regularly since that date. The Department of Agriculture for Northern Ireland obtained actual slaughter figures in connection with the Census of Production. The estimates of slaughter in the United Kingdom for the year June, 1924 to May, 1925 (the period to which the results of the agricultural Census of Production given in Table I refer) were as follows:

TABLE II.

U.K.: Slaughter of Live-Stock, 1924–5.

No. (000).

	England and Wales.	Scotland.	Northern Ireland.	Total United Kingdom.
Cattle	1,231	531	86	1,848
Calves	791	90	11	892
Sheep and Lambs	5,268	2,472	137	7,877
Pigs	4,500	242	176	4,918

The average value of cattle hides in 1924–5 was £1·99, of calf-skins 9*s*. 3*d*., and of de-wooled sheep and lamb skins 4*s*. 3*d*. Using these averages, which are based on weekly prices in the hide and skin markets and refer to the raw material in the form in which it is obtained from the slaughtered animals, the total value of hides obtained from cattle slaughtered off farms in the United Kingdom in the year 1924–5 was £3,678,000, while the value of calf skins was £413,000, and of sheep and lamb skins £1,674,000. Only a comparatively small quantity of pig skins are used by the leather industry in this country and their value in the aggregate would only be small. It may, therefore, be taken that out of the total of £111 million for the value of live-stock sold for slaughter in the year ending June 4th, 1925, £6 million or so represented the value of the hides and skins. The estimate for sheep skins refers only to the value of the pelt, which is the raw material for the sheepskin tanner. Of even greater value than the actual pelt is the wool obtained from it. According to the Census of Production report for the fell-mongering trade, the total value of pulled wool in 1924 was £3,454,000, and including firms not primarily engaged in fell-mongering this figure is raised to £4,034,000. About one-half of the skins treated in the country were imported and the other half of native origin. We are probably not far wrong, therefore, in placing the value of the wool obtained from the sheep and lambs slaughtered in this country at £2 million. The position of shorn wool is somewhat different from that of pulled wool. The value of the production of shorn wool in the United Kingdom in 1924 was £4,160,000, or one-sixth of the value of the sheep and lambs sold off the farms for slaughter. While shorn wool is undoubtedly a by-product in this country, sheep are reared in many parts of the world primarily for their wool. It was the higher price of wool following the post-war depression which induced farmers in Australia, New Zealand, the Argentine and elsewhere to increase their flocks, although no increase could be expected in the demand for mutton and lamb. Thus, while pulled wool is always a by-product, shorn wool may be either a by-product or a primary product.

In estimating the value of the agricultural output of the United Kingdom the Departments concerned appear to have omitted the value of fallen animals, *i.e.* animals dying from natural deaths. The chief value of these is usually in the hides and skins. The estimated number of natural deaths in the United Kingdom in 1924–5 was 173,000 cattle, 157,000 calves and 1,629,000 sheep and lambs, and I estimate that the total value of the hides and skins from these animals was £350,000.

Included in the estimates of live-stock slaughter given in Table II are the store cattle and sheep imported from Ireland and fattened on farms in Great Britain or Northern Ireland. The figures, however, do not include the fat cattle and sheep imported into Great Britain from Ireland and slaughtered on arrival. Very little tanning is done in the Irish Free State. According to an official report published by the Free State Tariff Commission last year, the consumption of the Irish tanning industry in recent years has been from 10,000 to 15,000 hides a year. This is less than 2 per cent. of the number of cattle slaughtered in the Free State or exported to Great Britain. With the exception of this small proportion the hides and skins from animals slaughtered in the Free State are exported to the United Kingdom, and it will be convenient, in considering the supplies of raw materials, to regard the by-products from Irish live-stock, whether slaughtered in the United Kingdom or in the Irish Free State and subsequently consumed in the United Kingdom, as native raw material. This principle has been followed in Table III, which summarizes the value of the supplies of native and imported raw hides and skins in 1924. In addition to making allowance for the Irish hides and skins and for hides and skins from fallen animals, it has been necessary to modify the figures previously given for the production of hides and skins in the United Kingdom in order to make the figures applicable to the calendar year 1924, and to deduct the exports of native hides and skins.

TABLE III.

U.K.: Supply of Raw Hides and Skins, 1924.

Description.	Native.	Imported.	Proportion of Total Supply, which is of Native Origin.
	£(000).		%
Hides	4,200	4,227	50
Calf Skins	430	179	72
Sheep and Lamb Skins * ...	1,300	1,175	53
Goat Skins	—	656	—

* Calculated on a de-wooled basis.

The total value of all hides and skins available in 1924 was £12·2 million, of which £6·2 million was imported. In addition, semi-tanned hides and skins to the value of £3·3 million were imported, chiefly from British India for retanning and dressing in this country. The total value of imported raw and semi-manufactured by-products used by the leather industry and included in R_I was, therefore, £9·5 million. Imports of finished leather used in the manufacture of footwear, leather goods, etc. totalled £8·5 million. The importation of other raw or semi-manufactured by-products is on a much smaller scale than in the case of hides, skins and leather, and the value of these in 1924 did not exceed £500,000. Summing these various items R_t would appear to be approximately £18·5 million.

The chief items included under r—the value of all other raw and semi-manufactured materials used by the by-product industries—are the tanning materials, oils, fats and mineral salts used by the leather industry. The vegetable tanning materials are almost entirely imported and in 1924 totalled £1·9 million. While it is not possible to give precise figures for the consumption of the other raw materials included under r, a careful consideration of the different industries leads to the conclusion that r is not greater than £5 million.

We can now turn to the question of estimating the total value of the output of the by-product industries. The principal manufactures are set out in Table IV.

TABLE IV.

Value of the Output of the By-Product Industries, 1924.

	£(000).
(*a*) From Hides and Skins:	
Boots and Shoes	£52,000
Output of Boot and Shoe repairers	20,000
Leather Gloves	1,985
,, Clothing	185
,, Machinery Belting	1,599
Saddlery, Harness and Leather Goods	6,300
Hat Leather	585
Parchment and Vellum	63
Leather exported (value at factory)	4,931
Total	£87,648
(*b*) Other Inedible By-Products:	
Hair—curled, dressed, etc.	1,190
Horn, Bone, etc., cut, turned or polished	1,091
Tallow and other Animal Fats	4,028
Glycerine—Crude	528*
Distilled	923*
Glue and Size	931
Gelatine	235
Bones for manufacturing purposes, Manure, etc., and Animal Residues	454
Total	£9,380
(*c*) Edible By-Products:	
Sausages, etc.	12,217
Animal and Poultry Foods	5,728
Preserved Meat in tins, glasses, etc., and Meat Extracts	4,060
Stearine	240
Lard Compound	1,516
Total	£23,761
TOTAL	£120,789

* A proportion of the crude glycerine is subsequently distilled and the figures, therefore, involve a certain amount of duplication. It is not possible, however, to give a figure for all glycerine, free of duplication.

In order to arrive at the total under (*a*), *i.e.* manufactures of hides and skins, two methods of approach are open. Leather itself is largely the raw material of other industries, such as the boot and shoe trade, the leather glove trade, etc. If the gross output (free of duplication) for these other industries be taken, the value of the production of the leather industry will have been accounted for to a great extent. There is, however, a balance of sole leather sold to boot and shoe repairers, and certain other leathers, such as hat leather, parchment and vellum and machinery belting, which undergoes no further processes as far as the leather and allied trades are concerned, and finally there is a considerable quantity of leather exported. The Census of Production report for the boot and shoe trades covered repairs done by boot and shoe manufacturers, but did not include the output of the independent repairers. It is, therefore, necessary to include an estimate for the output of this section of the industry. Making allowance for these various factors the total value of the production by this method is £87·6 million.

An alternative method is to take the gross output (free of duplication) of the leather industry and add the net output of the boot and shoe and other industries, and finally add the value of the retained imports of leather, which are, of course, included in the figure of £87·6 million. This calculation is as follows:

	£(000).
Leather: Gross output (free of duplication)	£30,000
Boots and Shoes (net output)	24,101
Boot and Shoe Repairers (net output)	15,000
Leather Gloves (net output)	910
Leather Clothing (net output)	80
Saddlery, Harness and Leather Goods (net output)	2,998
	£73,089
Net Imports:	
Undressed Leather*	1,396
Dressed Leather	7,080
Total	£81,565

* Excluding semi-tanned hides and skins which undergo further processes in this country, and are, therefore, included in the gross output of the leather trades.

The total reached by this method is £81·6 million. No allowance has been made, however, for the cost of transferring the leather from the leather manufacturer to the boot and shoe manufacturer or leather goods manufacturer, or in the case of imported leather for the charges between port and factory, while the total under (*a*) also includes a certain amount of raw materials other than leather. Taking these factors into consideration, the total of £87·6 million arrived at in Table IV (*a*), would appear to be substantially correct.

The items given under (*b*) and (*c*) in Table IV are admittedly incomplete. For example, large quantities of animal fats and tallow are used in the manufacture of soap, candles, etc., but they are not the principal raw materials of these industries as a whole, although they may be so for certain sections of these industries. The figure included for animal fats and tallow is taken from the report on the oil and tallow trades, and the proportion of this which ultimately goes, say, to the manufacture of soap or candles will be underestimated, since no allowance is made for the value added by further processes in the manufacture. A large number of articles manufactured from by-products find no separate classification in the Census of Production reports, and these while small in themselves amount to a considerable value in the aggregate. In one or two cases, such as animal and poultry foods, the figures may include quantities which are not essentially by-product manufactures, but the over-statement in these cases is more than compensated for by the items which it is impossible to isolate from the Census of Production reports. Strictly speaking the value of woollen goods made from home-produced wool, which is undoubtedly a by-product, could be included in the table. The woollen industry itself, however, is certainly not a by-product industry, and it has been considered advisable to exclude any allowance for the manufactures from native wool.

The final total of £121 million is almost certainly an understatement rather than an over-statement of O_T—the total output of the by-product industries in 1924.

Deducting from O_T the value of the imported raw and semi-manufactured by-products (R_I) and of the other raw and semi-manufactured materials used in by-product industries (i), we arrive at a figure of approximately £97 million as the contribution of the by-product industries to the national income of this country.

Although the actual value of the raw hides and skins is less than half the total value of the raw by-products of the live-stock industry, the value added by manufacture or the net output of the leather and allied industries is much greater than in the case of other inedible and edible by-products. Whereas the latter usually involve a single manufacturing process of comparatively short duration, hides and skins pass through many processes, some of which are quite lengthy, before they are tanned into leather, and the leather is then sold to the boot manufacturer or leather goods manufacturer and undergoes further processes before the finished article is sold to the public. Further light is thrown on the question of the magnitude of the by-product industries by an examination of the employment figures.

As far as the leather and allied industries are concerned the figures for 1924 are as follows:

Persons employed in the Leather and Allied Industries in 1924.

Industry.	Number.
Fell-mongering	2,753
Leather	31,696
Saddlery, Harness, Leather Goods, etc.	21,735
Boots and Shoes [*]	151,753
Leather Gloves	7,850
Boot and Shoe Repairing [*]	60,000
Total	275,787

[*] According to the industrial classification in the 1921 Census the number of persons associated with the manufacture and repair of boots and shoes in Great Britain, *i.e.* including operatives and administrative staff, was 209,000, while a further 11,000 persons who returned themselves as (i) boot and shoe makers and repairers, (ii) boot and shoe clickers and cutters, or (iii) other skilled boot and shoe factory operatives, according to the occupational volumes, were employed by firms not principally engaged in the manufacture and repair of boots and shoes.

The figures for the first four industries are taken from the Census of Production reports, and include out-workers. The figure for the leather glove industry is based on statistics published by the Joint Industrial Council for that industry, and also includes out-workers. This method has been adopted since the employment figures given in the Census Report for the glove trade cover the manufacture of leather, fabric and woollen gloves. Finally, the figure for the boot and shoe repairing trade is based on reliable estimates made by the trade association after allowing for a proportion of repairers covered by the Census of Production.

Turning to the other by-product industries we find that the manufactures concerned are generally only part of the output of the trade covered by the Census of Production report, and, since the employment figures refer to the total production, it has been necessary to assume that if the gross output (free of duplication) of a particular industry employing N people is X, the number of persons employed in a section of that trade manufacturing goods valued at x is $\frac{Nx}{X}$. On this assumption the number of persons employed in 1924 in the by-product industries enumerated in Table IV (*b*) and (*c*) was 29,000.

Taking all by-product industries together the total number of persons employed in 1924 would appear to be 304,800, and if allowance is made for the fact that the industries given under Table IV (*b*) and (*c*) are incomplete, it is probable that the figure is not less than 310,000.

It will be useful to terminate this part of the paper with a comparison of the gross output (free of duplication) and the number of persons employed in the by-product industries with the corresponding figures for some of the chief industries in the country. The comparison is as follows:

Industry.	Gross Output (free of duplication). £ million.	Persons Employed. Number (000).
Live-stock By-Product Industries	121	310
Cotton	255	528
Woollen and Worsted	141	276
Mechanical and Electrical Engineering	220	598
Shipbuilding	54	144
Clothing	124	376
Chemical	49	69

If the comparison had been made between the figures of Net Output the importance of the by-product industries would be even more marked than is shown by the above figures of Gross Output, since the net output, say, for the clothing industry would refer only to the final stage when the cotton, woollen or other piece goods are made up into apparel, no allowance being made for the net output of the industries manufacturing the piece goods.

PART II. SOME FACTORS RELATING TO LIVE-STOCK BY-PRODUCT PRICES, SUPPLIES AND DEMAND.

It is not possible within the time at my disposal to consider in detail the question of prices, supplies and demand for more than one of the many kinds of live-stock by-products. We have seen that both as regards the value of the output and the employment afforded, the leather and allied industries are the most important of the by-product industries, and since hides are the most important of the raw materials used by the leather industry, I propose to devote this part of the paper to a discussion of certain factors relating to hide prices, supplies and demand.

During recent years prices of live-stock by-products and in particular of hides and skins, have been subject to very violent fluctuations. This is clearly shown in Diagram A, in which the Hide Price index * is compared with the Board of Trade index of wholesale prices, both calculated on the basis of 1924 = 100. The data are given in Table V.

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* A hide as sold consists not merely of leather-producing substance, but also of water, hair, dirt and extraneous matter. The amount of these latter is frequently considerable, and varies substantially between different seasons of the year. In the case of hides produced in the United Kingdom the proportion is greatest in January, February and March and lowest in July and August. In the case of hides shipped in the wet-salted state (the raw hides are treated with salt to preserve them) from the Southern Hemisphere the position is reversed. The Hide Price index compiled by the Tanners' Federation is corrected for this seasonal variation in condition.

DIAGRAM A.

U.K.: Hide Prices and Commodity Prices.

(Hide Price Index and Board of Trade Index of Wholesale Prices.)

Monthly Average 1924 = 100.

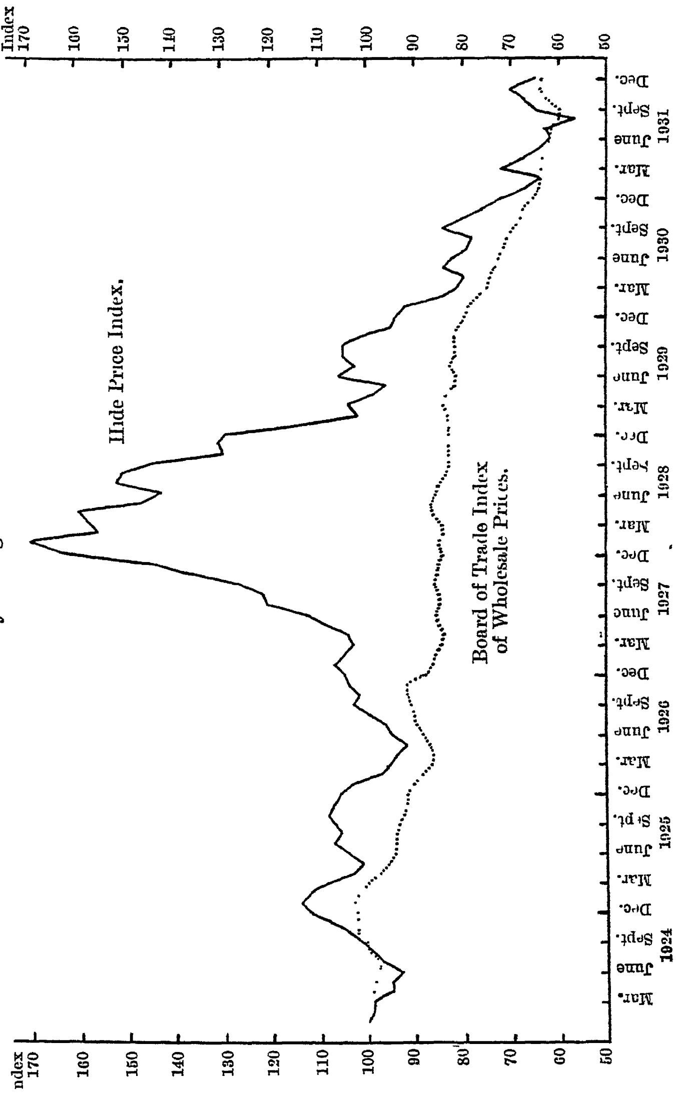


TABLE V.

U.K.: Hide Price Index and Board of Trade Index of Wholesale Prices.

(1924 = 100.)

Month.	Hide Price Index.	Board of Trade Index of Wholesale Prices.	Month.	Hide Price Index.	Board of Trade Index of Wholesale Prices.
1924.			1928.		
Jan.	100	99·6	Jan.	170	85·0
Feb.	99	100·6	Feb.	156	84·3
March	99	99·6	March	158	84·6
April	95	99·2	April	160	86·1
May	95	98·6	May	147	86·4
June	93	97·9	June	143	85·8
July	97	97·8	July	152	84·9
Aug.	99	99·5	Aug.	151	83·8
Sept.	101	100·5	Sept.	145	82·8
Oct.	104	102·4	Oct.	130	83·1
Nov.	108	102·3	Nov.	131	83·0
Dec.	112	102·4	Dec.	129	83·1
1925.			1929.		
Jan.	114	102·9	Jan.	114	83·2
Feb.	112	101·5	Feb.	102	83·3
March	108	99·9	March	104	84·4
April	103	97·4	April	99	83·4
May	101	95·4	May	96	81·7
June	104	94·6	June	106	81·6
July	107	94·4	July	103	82·7
Aug.	106	94·0	Aug.	105	81·8
Sept.	107	93·3	Sept.	105	81·7
Oct.	108	92·6	Oct.	101	81·9
Nov.	107	91·9	Nov.	95	80·6
Dec.	106	91·5	Dec.	94	79·7
1926.			1930.		
Jan.	103	90·3	Jan.	92	78·8
Feb.	97	88·8	Feb.	85	76·9
March	95	86·7	March	81	74·9
April	94	86·4	April	80	74·4
May	92	87·2	May	84	73·3
June	95	88·4	June	82	72·6
July	96	89·7	July	79	71·7
Aug.	100	90·1	Aug.	78	70·8
Sept.	103	90·8	Sept.	84	69·5
Oct.	102	91·5	Oct.	80	68·0
Nov.	104	91·7	Nov.	76	67·4
Dec.	105	87·9	Dec.	72	65·5
1927.			1931.		
Jan.	107	86·5	Jan.	67	64·3
Feb.	105	85·8	Feb.	64	63·9
March	103	84·7	March	72	63·7
April	104	84·2	April	67	63·6
May	109	85·1	May	64	62·8
June	113	85·5	June	62	62·1
July	121	85·1	July	63	61·5
Aug.	122	85·0	Aug.	57	59·9
Sept.	127	85·8	Sept.	65	59·7
Oct.	137	85·3	Oct.	67	62·8
Nov.	146	84·9	Nov.	70	64·0
Dec.	164	84·5	Dec.	65	63·7

During the latter half of 1927 the temporarily improved financial position in Europe was accompanied by an increased demand for hides, and with Russia also increasing her purchases, hide prices began to rise. Leather consumers in this country and in the United States, believing that hides would reach a permanently higher price level, hastened to increase their stocks of leather, with the result that the demand for hides was further stimulated. The rapid rise in prices between April, 1927, when the Hide Price index stood at 104, and January, 1928, when the index had risen to 170, took place at a time when wholesale prices, as represented by the Board of Trade index, remained practically unchanged. The time which elapses between the tanner buying raw hides and selling the leather made from these hides is often as much as six months. The bulk of the leather made from hides bought during the period of rising prices (April, 1927, to January, 1928) was sold after the latter date, when hide and leather prices were rapidly falling. The fall in hide prices subsequent to January, 1928, continued with the exception of one or two short recoveries until August, 1931, when for the first time since 1924 the Hide Price index fell below the index of wholesale prices. Measured in terms of purchasing power the prices of hides fell from 100 per cent. above the level of wholesale prices in January, 1928, to 5 per cent. below the level of wholesale prices in August, 1931. This period of falling hide prices was one of exceptional difficulty for the leather industry, and it will be worth while attempting to measure the degree of fluctuation in leather production and in the demand for raw material which accompanied the price movement initiated in 1927.

As far as the United Kingdom is concerned, a reliable indication of the variation in production is given by the quarterly index of production compiled by the Tanners' Federation, based on information regarding the production of all classes of leather, and used by the Board of Trade in their index of industrial production. In order to obtain figures which can be compared with the information available regarding other countries, the quarterly indices have been combined to give yearly figures, details of which are as follows:

1924	100
1925	96
1926	89
1927	97
1928	98
1929	85
1930	89
1931	85

The only large leather-producing countries for which regular production figures are available are the United States and Germany.

Details of the production of leather in the United States from the principal types of raw hides and skins are given in Table VI for the years 1924 to 1931.

TABLE VI.

U.S.A.: Production of Leather, 1924–31.

Year.	Hide Leather.	Leather from			Production of all Skin Leather.
		Calf Skins.	Goat- and Kid-skins.	Sheep- and Lamb-skins.	
	Million hides or skins.				Million sq. ft.
1924	22·0	16·5	35·9	42·5	599
1925	22·3	13·9	42·5	37·3	575
1926	21·5	15·7	49·8	36·1	623
1927	21·8	17·0	50·7	39·5	661
1928	20·2	15·6	54·9	42·3	684
1929	19·1	15·4	55·7	41·9	683
1930	17·7	14·2	55·4	33·6	621
1931	16·3	12·4	48·6	35·6	581

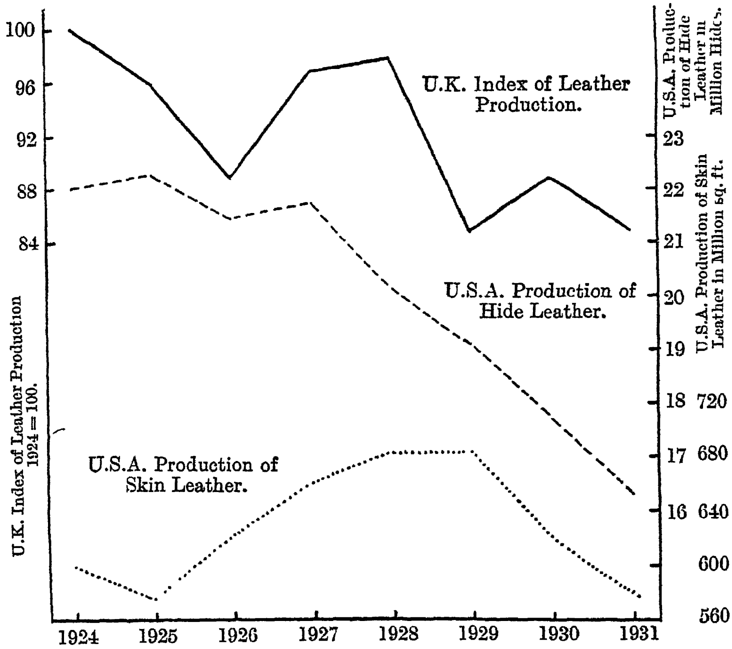
Between 1925 and 1931 the production of hide leather declined by 27 per cent. and a similar decline took place in the production of calf-skin leather between 1927 and 1931. Between 1924 and 1930 the production of goat- and kid-skin leather increased by 55 per cent., while the low point in the production of sheep- and lamb-skin leather (1930) was 21 per cent. below the high level of 1924. Leather produced from calf-, goat-, kid-, sheep- and lamb-skins is of a lighter character than that produced from hides, and is largely used for the manufacture of boot and shoe uppers, gloves, fancy leather goods, etc. It will, therefore, be useful to combine the production figures for these classes of leather in order to obtain a single index of the variation of light leather production. This has been done by assuming an average of 10 sq. ft. for calf skins, 5 sq. ft. for goat- and kid-skins, and 6 sq. ft. for sheep- and lamb-skins, the resulting totals in million sq. ft. being shown in the last column of Table VI.

The U.K. index of leather production and the United States figures of production of hide and skin leathers are represented graphically in Diagram B.

An annual census of production in the leather industry has been taken in Germany since 1925. The form in which the results of the census are published is such that while it is impossible to give separate totals for the production of leather from each of the principal classes of raw material, we can separate the hide leather, and the figures for this production, as well as the total production of leather, are given in Table VII.

Diagram B.

Leather Production in the United Kingdom and the United States.



The bulk of the hide leather produced in the world is tanned with the aid of vegetable tanning materials, while a large proportion of the lighter leather is produced by chrome or other mineral tannages. The vegetable tanning materials used are, either barks, such as oak, pine, wattle, mangrove, etc., woods, such as chestnut and quebracho, fruits or nuts, such as myrobalans, valonia and gall nuts, or leaves and twigs of shrubs like sumac and gambier, while many of these materials are manufactured into extracts before they are consumed by the tanning industry. The percentage of tannin contents contained in various materials varies from 7 per cent. in the case of chestnut wood to as much as 63 per cent. in the case of quebracho extract. If the quantities of the various tanning materials consumed in any particular country are available it is possible, by calculating the tannin content of each kind of material, to arrive at a final figure for the consumption of tanning materials during any year in terms of tannin units. In the case of Germany the figures of consumption of tanning materials are published in the Census of Production reports. Applying the method described to the German data the resulting figures shown in the last column of Table VII are obtained.

TABLE VII.

Germany: Production of Leather and Consumption of Vegetable Tanning Materials.

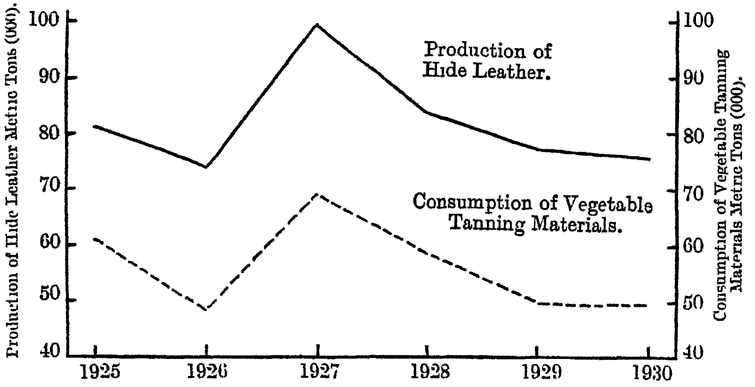
(Metric Tons.)

Year.	Production of		Consumption of Vegetable Tanning Materials. Tannin Units.
	All Leather.	Hide Leather.	
1925	129,500	80,900	60,800
1926	114,600	73,500	48,300
1927	150,700	99,300	68,800
1928	129,300	83,600	58,300
1929	117,400	76,900	49,700
1930	111,800	75,500	49,900

The figures in the last two columns of Table VII are represented graphically in Diagram C. In spite of the fact that some of the vegetable tanning materials are used for the production of light leathers, while a small proportion of the hide leather is chrome tanned, there is a remarkably close correspondence between the variations in consumption of vegetable tanning materials from year to year and the production of hide leather. This correlation in the case of Germany suggests that the figures of world consumption of vegetable tanning materials would give an indication of the variations from year to year in hide leather production. Unfortunately actual

DIAGRAM C.

Germany: Production of Hide Leather and Consumption of Vegetable Tanning Materials.



consumption figures only exist for two or three countries, but a very large proportion of the total world consumption of vegetable tanning materials enters into international trade. The United States certainly possesses a large supply of native chestnut wood, but she still imports about 50 per cent. of her total consumption of vegetable tanning materials. Germany possesses native supplies of oak and pine bark, but these amount to less than 20 per cent. of the total consumption of tanning materials. In the case of the United Kingdom over 95 per cent. of the vegetable tanning materials consumed from year to year are imported from abroad. France and Italy also possess native supplies of chestnut, but taking the aggregate for all countries, between two-thirds and three-quarters of the world consumption of vegetable tanning materials is imported.

Details of the exports of the principal tanning materials from the producing countries are given in Table VIII. Some of these materials are exported both in the crude state and also in the form of extracts, and the proportion of tannin contents varies considerably between the two forms. The appropriate percentage of tannin contents has been applied to the crude material and the extract separately and the resulting figures added together to give the total shown. Owing to the lack of the necessary data certain materials are omitted from the table, notably gambier, algarobilla and divi-divi, but the aggregate of these is not large and any variation from year to year in their supply would make very little difference to the variation in the aggregate supplies of all materials.

TABLE VIII.

International Trade in Tanning Materials.

Exports from producing countries.

In tannin units (tons).

Year.	Quebracho.	Wattle Bark and Extract.	Myrobalans and Myrobalan Extract.	Chestnut Extract.	Valonia.	Sumac.	Total.
1924	152,200	40,000	22,700	12,900	9,600	4,000	241,400
1925	192,700	44,700	17,600	10,800	10,900	3,100	279,800
1926	161,200	37,600	23,100	14,200	8,600	3,400	248,100
1927	183,900	41,300	32,600	16.600	11,300	4,400	290,100
1928	192,400	31,600	21,200	15,500	11,000	4,300	276,000
1929	147,000	29,800	20,600	12,500	11,200	3,600	224,700
1930	138,400	34,200	21,200	14,700	11,000	3,600	223,100
1931	147,900	30,300	17,500	11,300	10,000	3,000	220,000

The last column in Table VIII shows an increase of 17 per cent. in international trade in vegetable tanning materials between 1926 and 1927, followed by a fall of 22 per cent. between 1927 and 1929 or a fall of 24 per cent. between 1927 and 1931. Details of the consumption of tanning materials in the United States are available for the years 1925, 1927 and 1929 from the reports of the census of manufactures, and it is possible to arrive at the total of native tanning materials used in these years. The figures in tannin units are: 1925, 62,200 tons; 1927, 58,900 tons; and 1929, 54,400 tons. Adding these to the corresponding figures in the last column of Table VIII we get the following:

1925	342,000 tons (in tannin units).
1927	349,000 ,, ,, ,,
1929	280,100 ,, ,, ,,

These figures indicate a fall of 20 per cent. between 1927 and 1929 compared with the 22 per cent. indicated by the figures of international trade. It is probable that, if figures were available for the consumption of native tanning materials in France, Italy and other countries having native supplies, the figure of 20 per cent. would be reduced still further, since the consumption of native materials in these countries, as in the U.S.A., is almost certainly more constant than the figures of international trade.

If we regard the total figures of international trade in vegetable tanning materials as a first approximation to an index of hide leather production, the effect of allowing for the consumption of native tanning materials in the different leather-producing countries (assumed to be more stable than the figures for international trade) would be to diminish the variations given by the first approximation. Allowing for a constant supply of native tanning materials, *i.e.* a "damping factor," of the order of 100,000 tons in tannin units, we can obtain a second approximation to the index of hide leather production. The two series of indices, which are represented graphically in Diagram D, are as follows:

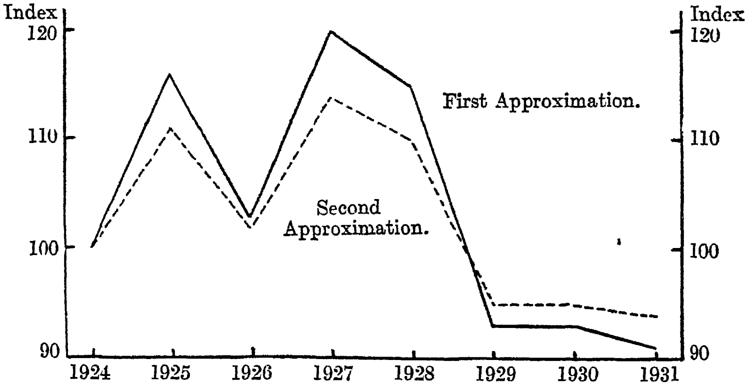
	First Approximation.	Second Approximation.
1924	100	100
1925	116	111
1926	103	102
1927	120	114
1928	115	110
1929	93	95
1930	93	95
1931	91	94

It is improbable that the native supply of tanning materials in the leather-producing countries is actually constant; for example, consumption of native materials in the United States declined by 5 per cent. between 1925 and 1927, and by a further 8 per cent.

between 1927 and 1929. It is, therefore, probable that the true index of hide leather production lies between the first and second approximations.

DIAGRAM D.

Index of World Production of Hide Leather. 1924 = 100.



Another factor which is closely connected with the question of hide prices is that of leather stocks. At a time of active demand and rising prices, leather merchants and consumers are willing to carry heavier stocks than during a period of falling prices. In the United States statistics are available regarding the quantities of leather held by merchants, boot and shoe, and leather goods manufacturers. During 1927 hide prices in the U.S.A. increased by 40 per cent., while the total quantity of hide leather in consumers' hands increased by nearly 20 per cent. With the subsequent fall in prices during 1928 leather consumers began to reduce their stocks, and at the end of the year these had fallen by nearly 10 per cent., while hide prices had fallen by 15 per cent. This process was continued throughout the next three years, and at the end of 1931, when hide prices were only 30 per cent. of what they were at the end of 1927, consumers' stocks had fallen by 30 per cent. Figures regarding the stocks of leather in consumers' hands in the United Kingdom are not available, but an interesting comparison can be made between hide prices and stocks of leather in producers' hands. From the beginning of 1931 until the end of August, *i.e.* prior to the suspension of the gold standard, hide prices declined by 17 per cent., while stocks of hide leather in producers' hands increased by 19 per cent. From the end of August to the end of November hide prices increased by 23 per cent., while stocks of hide leather in producers' hands fell by 45 per cent. During the period of falling hide prices prior to the suspension of the gold standard, leather consumers were buying only for their immediate requirements, but with the rise in hide prices between September 21st and the end of November, merchants and manufacturers bought in excess of their immediate requirements, a considerable proportion of the leather going into consumers' stocks.

While attempts have been made to estimate the order of magnitude of the world's slaughter of live-stock, it is quite impossible to obtain figures of the variation in world slaughter from year to year. Some light, however, may be thrown on the problem by an examination of the trend of world cattle stocks. The International Institute of Agriculture publishes yearly the latest census figures or estimates of live-stock population in most countries, but, owing probably to the fact that the figures for some countries are only determined at intervals of several years, no attempt has been made by the Institute to give aggregate world figures. Yearly figures are available, however, for a very large proportion of the more important countries, and it is possible to obtain fairly reliable aggregate figures by interpolating for those countries for which figures are only available at irregular intervals. Adopting this method and grouping the countries into continental areas, I arrive at the figures given in Table IX for the number of cattle in the principal countries. The pre-war figures are given in this table in comparison with the yearly figures for the period 1925–30.

TABLE IX.

Number of Cattle in the Principal Countries of the World.

Number in millions.

	Pre-War.	1925.	1926.	1927.	1928.	1929.	1930.
Europe (except Russia) ...	93·5	100·5	100·7	101·7	102·2	102·4	103·1
Asia ,, ,, ...	151·1	172·8	170·3	172·7	168·7	169·8	172·7
Russia	60·3	59·8	63·3	68·2	70·7	67·2	52·6
North and Central America	78·3	80·4	77·6	77·2	77·1	79·3	80·4
South America	82·0	96·5	96·0	94·7	94·8	94·4	93·7
Africa	33·8	46·5	48·1	49·3	49·4	51·1	53·4
Oceania	13·7	17·0	15·6	15·1	14·8	14·9	15·5
Total	512·7	573·5	571·6	578·9	577·7	579·1	571·4

Certain countries, notably China and parts of Africa and South America, are omitted owing to the lack of any reliable data, but a comparison of the pre-war figure with the estimate of total world stocks made by J. R. Arnold of 572 to 579 millions indicates that the figures in Table IX cover about 90 per cent. of the world total. The striking feature of the aggregate figures is the very small degree of variation in the post-war years. These figures certainly do not suggest that there could have been any considerable fluctuations in slaughter and hence in hide supply during the period 1925–30.

None of the principal tanning countries of the world is self-supporting as regards supplies of hides and skins. Even in a year of low production these countries find it necessary to import large quantities of raw material. The native slaughter in any country is determined by the demand for meat, and when the hides and skins from the animals slaughtered for this purpose have been used, any balance in the requirements of the leather industry has to be made up by imports from countries having surplus requirements. Unfortunately very few countries publish figures of live-stock slaughter, and it is impossible to attempt any estimate of the variation in native supplies of hides and skins in the principal tanning countries in the aggregate. It is possible, however, to examine the figures of international trade in hides from the trade returns of the different countries. We can account for about 90 per cent. of the hides imported into consuming countries, but, owing to the fact that these hides come from practically every country in the world, many of which only publish trade figures at irregular intervals, it is only possible to obtain the figures of exports for a smaller proportion (70 to 80 per cent.) from the countries of origin. While, however, a survey of imports may be more comprehensive than that of exports, the latter does help to throw considerable light on the interpretation of the import data.

When hides taken from cattle, say, in South America, Africa or Australia, are intended for export, say, to Europe or North America, it is necessary that precautions be taken to prevent deterioration and bacteriological action before the hides reach the ultimate consumer. The oldest method of preserving hides is by drying in the sun, and this practice is still followed in many parts of the world. Another method is to treat the hides with common salt, later drying them in the sun, a process referred to as dry-salting, while a third method, practised in the Frigorifico establishments of South America, in South Africa, Australia, New Zealand, and to a lesser extent in certain other countries, is to ship the raw hides in bundles with layers of salt sprinkled over each hide. This is the wet-salting process. While the latter type of hides are generally considered to be superior to the dry or dry-salted hides, the process is one which, owing to the greater bulk and weight involved, can only be adopted if transport facilities allow. Thus hides from the interior of Africa, South America, India, China and from tropical countries generally are almost invariably dry or dry-salted.

A summary of the imports and exports of hides from the chief countries is given in Table X. The trade returns for all countries do not separate wet and dry hides (it is convenient to use the term "dry hides" to cover both the dry and dry-salted variety), but where such division is made the figures have been taken out separately. The first column in Table X (*a*) shows the imports of dry hides into those countries which give dry hide figures separately, while the second column gives the corresponding figures for wet hides. The third column gives wet and dry hides, being the summary for all countries which do not separate the two classes. As the figures in this column are about 40 per cent. of the total imports it is necessary to turn to the second part of the table, (*b*), which shows the aggregate exports of hides from all countries for which the figures are available, in order to compare the variations from year to year in the supplies of dry and wet hides. In (*b*) the data for countries which are essentially exporting, *i.e.* which have a surplus hide supply, are separated from those of European and North American countries, *i.e.* essentially importing countries.

TABLE X.

(a) *Aggregate Figures of Imports of Hides into Consuming Countries.*

Figures in Columns (1) and (2) are for countries giving dry and wet hide figures separately, while figures in Column (3) are for countries giving dry and wet figures together.

Cwt. (000).

Year.	Dry Hides. (1)	Wet Hides. (2)	Dry and Wet Hides. (3)	Grand Total for all Hides.
1926	940	4,000	4,390	9,330
1927	1,810	4,920	4,360	11,090
1928	1,810	4,760	4,490	11,060
1929	1,330	4,730	4,080	10,140
1930	1,270	4,700	4,060	10,030
1931	1,060	3,870	4,040	8,970

(b) *Aggregate Figures of Exports of Hides from Countries for which Figures are available.*

Cwt. (000).

Year.	Countries essentially Exporting, *i.e.* having a Surplus Hide Supply.		European and North American Countries.	Grand Total for all Hides.
	Dry Hides.	Wet Hides.		
1926	1,710	3,630	3,410	8,750
1927	2,310	3,860	3,580	9,750
1928	2,490	3,520	3,490	9,500
1929	1,850	3,140	3,720	8,710
1930	1,510	3,250	3,690	8,450
1931	1,220	2,890	3,510	7,620

While the final figures of imports in Table X (*a*) represent a very large proportion of the world's total they do not form a reliable index of the extent to which the tanning industry is drawing on the world's hide supply. The total figures include imports from countries which are themselves consumers of hides. Any increase in the trade between consuming countries will therefore add to the total import figure without adding a single hide to the total number available over and above the aggregate native supplies in the tanning countries. The principal consumers are the European and North American countries. Exports from these countries are shown in the second table. It will be seen that in 1929, when total exports from countries having surplus hide supplies were declining, exports from European and North American countries actually increased. A more reliable indication of the extent to which the tanning industry is taking hides from countries having surplus exports is obtained by comparing the figures for different years obtained by subtracting the exports from European and North American countries from the total imports for all consuming countries. The resulting figures for the years 1926–31 are as follows:

Quantity of Hides Imported by Tanning Countries from Countries having Surplus Exports.

	Cwt. (000).
1926	5,920
1927	7,510
1928	7,570
1929	6,420
1930	6,340
1931	5,460

These figures indicate a slightly higher level of imports in 1928 than in 1927. The greatest demand for hides was in the second half of 1927, and stocks of raw hides in nearly every country at the end of 1927 were at a very low level, while large quantities of hides were bought ahead, and these would not be delivered until the early months of 1928. Taking the average of 1927–8, which is 28 per cent. higher than in 1926, as indicating the highest level in the demand for hides, the figures indicate a fall of nearly 28 per cent. in 1931 compared with the maximum demand.

According to Table X (*b*) the exports of dry hides from countries having a surplus hide supply fell by 51 per cent. between 1928 and 1931, while the exports of wet hides fell by 25 per cent. between 1927 and 1931. In absolute figures the exports of dry hides fell by 1,270,000 cwt., while the exports of wet hides fell by 970,000 cwt. These figures, however, are somewhat misleading, since 1 cwt. of dry hide yields approximately 1·6 cwt. of leather, while 1 cwt. of wet-salted hide yields rather less than 0·8 cwt. of leather.

Calculated in terms of the yield of leather, the decline in dry hides was equivalent to approximately 2 million cwt. of leather, while the fall in exports of wet hides was equivalent to approximately three-quarters of a million cwt. of leather. It would, therefore, appear that there is a very large quantity of dry hides produced in Africa, Asia and South America, which only come on to the world's market if the demand for leather, and hence for hides, is above the normal level.

It is worth while examining more closely the position of dry hides. The cost of transport is a very big factor in the marketing of dry hides. The hides are often produced many hundreds of miles away from a collecting centre, and the question of whether it is worth while transporting them depends very often upon the price which is likely to be obtained. It is not possible to obtain data which would enable a comparison to be made between dry hide prices and the quantity of hides coming forward for any but a few of the countries producing dry hides. It is possible, however, to obtain an aggregate figure for the monthly imports of dry hides into four of the principal consuming countries, the United Kingdom, the United States, Germany and Holland. These countries will probably account for about two-thirds of the total world consumption of dry hides. In Diagram E the hide price index for dry and dry-salted hides is compared with the figure of aggregate imports of dry and dry-salted hides into the four countries named. The latter curve has been smoothed by using a three-monthly moving average. This diagram shows very well the close connection between dry hide prices and the quantity coming forward. There is one fact, however, which calls for special comment. During the latter half of 1929 an increase in the consumption of dry hides was accompanied by a falling price level, and although there was a subsequent decline in imports, it would appear that more dry hides came forward in 1930 and 1931 than would have done so in, say, 1926, had the price level been as low as it was in the last two years. This is almost certainly due to the increased transport facilities, which are now available in remote parts of Africa and elsewhere.

The position regarding hides may be summarized as follows:

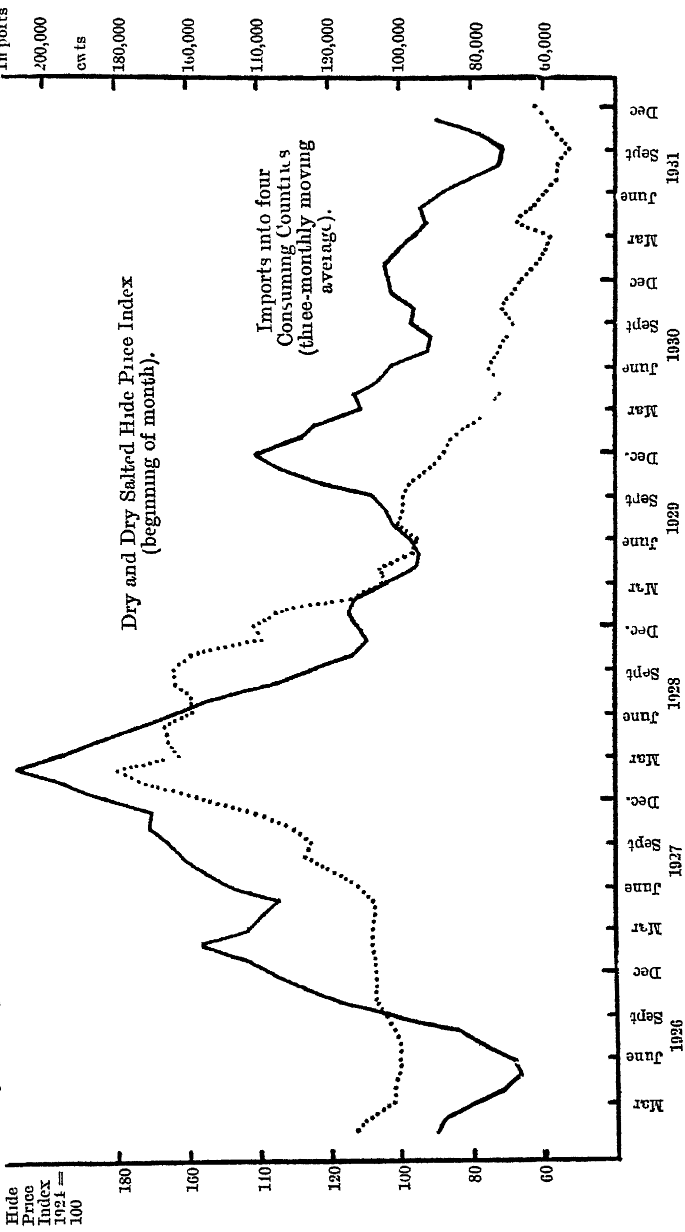
(1) The index of world production of leather indicates an increase in production of 12 per cent. to 17 per cent. between 1926 and 1927, followed by a fall of 18 per cent. to 24 per cent. between 1927 and 1931.

(2) An examination of the aggregate cattle stocks in the principal countries of the world suggests that the total hide supply available if it had been needed during the period 1925–30 was relatively constant.

DIAGRAM E.

Dry Hides. Relation between Prices and Consumption.

Dry and Dry Salted Hide Price Index and Aggregate Imports into U.K., U.S.A., Germany and Holland



(3) International trade in hides between countries having surplus exports and consuming countries increased by 28 per cent. between 1926 and 1927–8, while there was a fall of 28 per cent. between 1927–8 and 1931.

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I wish to express to Dr. E. C. Snow my grateful appreciation of his helpful criticism and advice during the preparation of this paper.

APPENDIX.

ESTIMATES OF LIVE-STOCK SLAUGHTER IN GREAT BRITAIN AND IRELAND.

The question of supplies of live-stock by-products in this country is closely allied with the subject of live-stock slaughter, and, as this matter is one which has received comparatively scant attention in the past, it may be profitable to consider it in some detail.

Reference has previously been made in the paper to the fact that almost the whole of the production of hides and skins from Irish cattle is consumed in the United Kingdom. It will, therefore, be advisable to consider estimates of live-stock slaughter for Ireland as well as Great Britain, and subsequently to make allowance for the small local consumption in the Free State.

Cattle.

The method of calculating the slaughter of cattle is as follows: from the number of cattle one year old and above at one census is deducted (*a*) the estimated number of natural deaths during the year and (*b*) the number of cattle two years old and above at the following census. This gives the slaughter of cattle from those enumerated at the beginning of the year. If we were considering, say, England and Wales as a single unit, it would be necessary, in order to obtain the total slaughter of cattle fattened in the country, to add the imports of store cattle during the year. Since, however, we are considering Great Britain and Ireland as a unit, the movements of cattle from one country to another will not affect the final estimate.

The various agricultural departments have published separate estimates for the percentage of natural deaths and it is, therefore, advisable to apply the method of calculation to England and Wales, Scotland and Ireland separately, although the resulting estimates are later combined to give a single figure for Great Britain and Ireland. This has been done in Table XI, where the figures for individual countries do not represent the actual slaughter in those countries, but merely the number slaughtered or exported during the year from those enumerated at the beginning of the year.

The figure used for natural deaths in England and Wales is 2⅞ per cent. of the average number of cattle aged one year and above during the year, while that for Scotland is 2 per cent. The Department of Agriculture for Northern Ireland obtained figures of mortality among cattle during the four years 1923–27, and, while the proportion was fairly constant at 1·6 per cent. in three of these years, it was found that the rate was as high as 3·7 per cent. in 1924–25, a year which included a particularly severe winter. The rate of mortality of cattle in the Irish Free State was estimated in 1926–27 at 2·7 per cent. of the average cattle population, and I have taken the figure for Ireland as a whole to be 2½ per cent.

TABLE XI.

Great Britain and Ireland: Estimated Slaughter of Cattle and Supply of Hides, 1923-24—1930-31.

Number (000).

Year. June–May.	Estimated Slaughter or Slaughter plus Exports from Cattle enumerated at the beginning of the Year.				Estimated Number of Natural Deaths.	Estimated Hide Supply.
	England and Wales.	Scotland.	Ireland.	Total.		
1923–24	955	261	875	2,091	250	2,341
1924–25	821	221	1,088	2,130	251	2,381
1925–26	1,006	269	860	2,135	251	2,386
1926–27	1,028	252	816	2,096	253	2,349
1927–28	1,202	274	866	2,342	253	2,595
1928–29	1,055	255	974	2,284	251	2,535
1929–30	1,071	281	995	2,347	248	2,595
1930–31	899	305	1,004	2,208	247	2,455

Provided the census figures themselves are correct, the accuracy of the final estimate of slaughter depends on the accuracy of the allowance for natural deaths. The fact that the same mortality rates are used for each year, and that these rates are based on single year's experience suggests that there may be an appreciable margin of error in the allowance for natural deaths. The Board of Agriculture for Scotland published separate mortality rates for the five agricultural divisions of that country in 1924–25, and these varied from 1·4 per cent. in the Northern and North-Western area to 2·3 per cent. in the Western and South-Western area. The only mortality rates, which have been determined for a series of years, are those for Northern Ireland, to which reference has already been made. These show that if the mortality rate for 1924–25 had been applied to 1923–24, 1925–26 and 1926–27 the estimate of natural deaths in those years would have been more than 100 per cent. above the true figure. If, owing to a particularly bad winter or the prevalence of disease, the mortality among English cattle increased by 1 point from $2\frac{7}{8}$ to $3\frac{7}{8}$ per cent. and similar increases of 1 point occurred in the rates for Scottish and Irish cattle, the number of fallen animals would increase by approximately 100,000. This implies a corresponding decrease in the estimate of slaughter representing an error of 4 to 5 per cent. in the original estimate based on the fixed mortality rates. The estimates of meat supplies based on the slaughter figures would involve the same percentage error. From the point of view of the hide supply, however, the appropriate estimate is the total of slaughter plus natural deaths, and any error in the former is automatically cancelled by the corresponding error in the latter. The final column in Table XI shows the estimated hide supply in Great Britain and Ireland. The accuracy of this figure depends solely on the accuracy of the census data.

The percentage margin of error in the census data is probably greatest in the age classification. While there is no reason why errors of this description should be made wilfully as in the population census, they may easily be made inadvertently. For example, a farmer having a large number of young cattle on June 4th, 1932, and knowing that they were born the previous spring, might enter them *en bloc* in "cattle, one year old and under two," although some might have been born after June 4th, 1931, and therefore not included in the previous census as cattle under one year. The Department of Agriculture for Northern Ireland published figures for the percentage of births in each month in 1925. These figures are given below in comparison with some earlier figures for Ireland based on the average of the years 1912–13 and 1917–18.

Percentage Births of Calves in each Month.

	Northern Ireland, 1925.	Ireland, Average of 1912–13 and 1917–18.
Jan.	7	5·2
Feb.	10	10 3
March	18	27·3
April	20	28·7
May	14	17 0
June	5	1·4
July	3	1·2
Aug.	4	1·5
Sept.	5	1·5
Oct.	4	1·5
Nov.	5	1·7
Dec.	5	2 7

The 1912–13 and 1917–18 figures indicate that 88 per cent. of the births occurred in the first five months of the year, while the 1925 figures show only 69 per cent. in that period. The possible error from age mis-statement will be greatest for cattle born in a year in which the percentage of births in June and succeeding months is above the average, and such error will affect both the estimates of slaughter of cattle and calves.

Evidence available in the tanning industry regarding the hide supply during recent years points to a falling off during 1931 following three years of comparatively steady supply. This evidence is in very close agreement with the figures in the last column of Table XI.

Calves.

The estimation of the slaughter of calves involves allowances for births and natural deaths. From the total number of cattle under one year old at one census plus the estimated births during the year is deducted the number of natural deaths during the year and the total number of cattle under two years old at the end of the year. The number of births of calves in England and Wales is taken at 80 per cent. of the average number of dairy cattle during the year, while the corresponding percentages for Scotland and Northern Ireland are 86 per cent. and 83 per cent. respectively. The figure of 83 per cent. has been used for Ireland as a whole. Natural deaths are estimated at 11 per cent. of the average of the number of animals under one year old at the beginning and end of the year for England and Wales, at 7·1 per cent. for Scotland and 7·0 per cent. for Ireland. The result of applying the method to England and Wales, Scotland and Ireland is shown in Table XII, and as in Table XI it must be

TABLE XII.

Great Britain and Ireland: Estimated Slaughter of Calves and the Supply of Calfskins, 1923–24—1930–31.

Number (000).

Year. June-May.	Estimated Slaughter or Slaughter plus Exports from Calves enumerated at the beginning of the Year.				Estimated Number of Natural Deaths	Estimated Calf-skin Supply.
	England and Wales.	Scotland.	Ireland.	Total.		
1923–24	825	119	209	1,153	257	1,410
1924–25	791	90	361	1,242	260	1,502
1925–26	811	92	253	1,156	260	1,416
1926–27	887	94	155	1,136	265	1,401
1927–28	982	81	131	1,194	265	1,459
1928–29	926	81	152	1,159	260	1,419
1929–30	933	68	227	1,228	254	1,482
1930–31	808	75	83	966	258	1,224

emphasized that the figures for the individual countries do not represent the actual slaughter in those countries, but merely the number slaughtered or exported during the year from those enumerated at the beginning of the year. The movement of calves from one country to another will have to be taken into account if the actual slaughter figures for one particular country are required, but these movements cancel out when the three figures are added together to give a total for Great Britain and Ireland as a whole.

The margin of error in the estimates of slaughter of calves is almost certainly very much greater than in the estimates of cattle slaughter. In the single year 1924–25, on which the birth-rate is based, the Board of Agriculture for Scotland found that the number of births per 100 dairy cattle varied from 80 in the Northern and North-Western division to 91 in the North-Eastern division, while the number of natural deaths varied from 3·8 per cent. in the former division to 10·3 per cent. in the Western and South-Western division. If, during any particular year, the birth-rate in England and Wales was, say, 82 per cent. instead of 80 per cent., while there were similar increases in the rates for Scotland and Ireland, the number of births in the whole of Great Britain and Ireland would be about 95,000 more than the estimate based on the fixed percentage, and this would involve an error of 8 to 10 per cent. in the estimate of slaughter. If, as might well happen, during a particularly good year an increase in the birth-rate was combined with a fall in the rate of mortality, the error in the estimates of slaughter would be still further increased.

In order to obtain an estimate of the calfskin supply it is necessary to add the slaughter plus natural deaths, and the resulting figure, though independent of the mortality rate, is still subject to a considerable margin of error from the use of the fixed birth-rate.

Sheep and Lambs.

The method of calculating the slaughter of sheep and lambs is as follows: to the total number of sheep and lambs at one census is added the estimated number of births during the next year, and from the resulting figure is deducted the estimated number of natural deaths and the total number of sheep and lambs at the end of the year. The number of births of lambs in England and Wales is taken to be 118 per cent. of the number of ewes at the end of the year, while the corresponding figures for Scotland and Ireland are 102 per cent. and 110 per cent. Natural deaths are estimated at 7·5 per cent. of the average number of sheep and lambs at the beginning and end of the year in England and Wales, with corresponding figures of 5·9 per cent. and 7·0 per cent. for Scotland and Ireland respectively. The resulting estimates of slaughter are shown in Table XIII, which is drawn up in a similar manner to Tables XI and XII, *i.e.* no account is taken in the figures for the individual countries of the movements of animals from one country to another.

TABLE XIII.

Great Britain and Ireland: Estimated Slaughter of Sheep and Lambs and the Supply of Sheep- and Lamb-skins, 1923–24—1930–31.

Number (000).

Year. June–May.	Estimated Slaughter or Slaughter plus Exports from Sheep and Lambs enumerated at the beginning of the Year.				Estimated Number of Natural Deaths.	Estimated Sheep- and Lamb-skin Supply.
	England and Wales.	Scotland.	Ireland.	Total.		
1923–24	4,989	2,548	1,597	9,134	1,713	10,847
1924–25	5,261	2,471	1,294	9,026	1,797	10,823
1925–26	5,855	2,671	1,195	9,721	1,893	11,614
1926–27	6,729	2,537	1,327	10.593	1,961	12,554
1927–28	7,497	2,852	1,404	11,753	1,967	13,720
1928–29	7,002	2,923	1,464	11,389	1,942	13,331
1929–30	6,611	2,849	1,502	10,962	1,953	12,915
1930–31	5,855	2,917	1,585	10,357	2,032	12,389

As in the estimates for slaughter of calves, the possible margin of error in the estimates of slaughter of sheep and lambs is substantial. The only available figures indicating the range of births and mortality rates in any particular year are those published by the Board of Agriculture for Scotland. These show a range of 86 to 124 for the birth-rate and of 4·2 to 7·3 for the rate of mortality over the five agricultural divisions of the country. If in any particular year the birth-rate in each country was 2 per cent. above the fixed percentage used in these calculations, the actual number of births would be about 240,000 more than calculated, involving an error of 2 to 2½ per cent. in the slaughter figures. An error of 1 point in the rate of mortality would involve an error of 2½ to 3 per cent. in the estimated slaughter.

DISCUSSION ON MR. WHITE'S PAPER.

PROFESSOR H. S. JEVONS: I have much pleasure in moving a vote of thanks to Mr. White for reading this paper on what is undoubtedly an important industry in this country. As he has pointed out, the Society has recently had before it papers on separate industries, and we may hope that in course of time the major industries of the country will be covered by different Fellows.

I have been impressed in this paper by the very numerous sources from which Mr. White has collected his statistics and the considerable ingenuity which has been employed in arriving at some inferences where he could not get direct evidence, particularly in estimating the quantity of hides produced by the quantities of tanning materials and extracts which come into international trade. I do not know what the margin of error may be in this estimate; there must be some amount of error, but the method is most ingenious, and the estimate is probably a fairly correct indication of the total production.

I think that if we were to go into one or two of the economic questions which Mr. White has raised, it might be found not quite easy to agree with him. In particular, there is his statement at the beginning of the paper that an increase in the demand for hides does not add a single hide to the world's supply, although it may increase the quantity going onto the world's market. Looking at it from the point of view of economic theory, one would not like to make quite such an emphatic statement as that. I should say that the theory of joint products must hold good, although of course conditions may be such as would lead to the result being particularly small. For instance, if there were to be a considerable increase in the demand for hides extending over a lengthy period, then undoubtedly there would be a greater tendency to breed cattle, because the farmer would get a higher price. I can see that in a short time—for instance, the kind of rise of demand illustrated in the year 1926–7—the increase in the number of cattle is nil. The increased supply of hides at such a time actually comes from collection over a larger area, particularly from those distant parts of Africa and Asia where there are large quantities of cattle but means of transport is poor, and from inclusion of hides of inferior quality. In India when a rise in price takes place a poorer quality of hides is drawn upon. That is undoubtedly one of the ways in which the world supply is increased. It must be remembered that in places like India and all the Asiatic and African countries quite a large percentage of the hides are unfit for international trade; these are tanned by the most primitive native methods, and are cut up and used for all sorts of purposes.

Turning to the supply, there is an illustration that the theory really does work in relation to hides. I was in India during the latter part of the War, and talking soon after the Armistice to an officer in the Army Service Corps. He was telling me about some contracts which he had just placed, and said that he felt sure the contractors who supplied beef to the British regiments there had formed a ring in order to put up the price of meat. The rise of the price of meat had been quite substantial, and no tender was as low as in the previous year. I was puzzled and could find no answer, but soon afterwards I realized that the probable reason was that the Government of India had recently put on a heavy export duty on hides; and there had undoubtedly been a slump in the price of hides in the home market, so more had to be obtained for the meat.

If it had been possible for Mr. White to deal with other by-products enumerated at the beginning of the paper, a little more fully than he has done, I should have been glad to know of their reactions on agriculture in this country. It does seem to me to be a subject of great importance to England. We are glad to have this paper, because we hope it will stimulate further inquiries on the by-products of the meat industry. If we could develop a larger by-product industry, dealing with all sorts of products on a large scale, as is done in America, this would be to the benefit of the English farmer. If better prices could be obtained for the by-products, the farmer would get a better price for his cattle, and would be encouraged to breed a better type, and a larger proportion of the meat supply of the country might come from our own fields. The problem as it presents itself in this country seems to be that we have hundreds of slaughter-houses scattered about the country—twenty or thirty for London alone—and the result is that the hides, offal and so on, are collected by small merchants who go round to the butchers at the slaughter-houses, collecting a few here and a few there. Naturally they do not pay as good prices, because their transport costs are high, as these hides and offals would fetch if produced at a big slaughter-house. In America and the Argentine the slaughter-houses deal with many thousands of animals a week at one place, and the recovery, treatment and sale of by-products can be carried on scientifically on a large scale. It has been suggested even that in some American packing houses so many and valuable products are obtained from the offals, blood, and non-edible parts that it is the meat which may be regarded as a by-product.

If there could be the same kind of organization in this country, it would be found that the meat industry would develop most extensively. I am afraid this is a digression from the subject of the paper, but I wanted to illustrate how important it is that studies of this great industry should be undertaken, and I am very pleased to propose a vote of thanks to Mr. White for the paper he has given us.

MR. H. BRADLEY: I congratulate the author of the paper, and welcome the opportunity of seconding the proposal put to the meeting by Professor Jevons. Coming, as I do, from one of the by-product industries—the boot and shoe trade—I read with very keen interest the advance proof of Mr. White's paper. Not only with interest, but also with intense pleasure. I found it lucid and pleasant to read, and I was struck with the high degree of concordance that Mr. White had obtained by his various methods of arriving at his estimates. I was also deeply impressed by the immense amount of work he had put into his subject; it must have taken a long time to compile a paper of this description.

In regard to Table VII. on page 472, if I understand Mr. White aright in regard to the tannin units, I find the following conclusion. A vegetable tanned leather contains on the average something like 37 per cent. of actual tannin material. The fraction 37 per cent. of the hide leather figures leads to estimates of tannin material in the neighbourhood of ½ to ⅓ of the figures shown in the table, suggesting that ½ to ⅓ of the vegetable tannin matter imported into the country is wasted—run down the drains. In other words, the hide does not take up more than a fraction of the tannin matter offered to it. This, unquestionably, is well known, but it is obviously an important matter for investigation on the part of the tanning industry, and the statistical data give us a measure of its importance. I do not feel competent to take up advantageously a great deal of the time of this meeting, but that is a point that appeared to me to be of great interest, as is also the matter of the lower quality hides coming on to the market in times of high hide prices. To the boot and shoe industry, purchasing leather, this means that in times of prosperity a watch must be kept in regard to the quality of the material bought.

In conclusion, I would say that I think this paper is of tremendous importance, and of particular value as a work of reference on the by-product industries. I heartily support the vote of thanks proposed by Professor Jevons.

MR. R. F. GEORGE wished to associate himself with the proposer and seconder of the vote of thanks to Mr. White. He felt a special satisfaction in doing so, as the Study Group claimed Mr. White as one of its own people. He congratulated Mr. White upon the design of the paper, which was extremely neat, orderly and logical. If, now and again, the reader, through his own fault, did not know where he was, he certainly knew where he ought to be.

On page 457 Mr. White outlined his plan, which dealt first with the Magnitude of the By-Product Industries, and secondly with "some factors relating to prices, supplies of and demand for *livestock by-products*." The word "hides" might have been preferably used instead of the phrase, "livestock by-products."

On reading the sentence referred to by Professor Jevons, on page 455, "An increase in the demand for hides does not add a single hide to the world's supply," Mr. George at first sight thought there was some ambiguity. It might have been better to have said "potential supply." Mr. White went on to say that if prices rose, more hides came on to the market. It might be argued that the amount coming on to the market constituted the supply. It could be imagined that a sufficient rise in the price of hides would bring about a decision to slaughter animals which hitherto were just on the verge of being killed.

With regard to the value of the by-products, it was well to emphasize the importance of assessing the value at the point of production—in most cases the place of slaughter. In this respect Mr. George would like to know what was more particularly meant on page 460, where Mr. White said: "The average value of cattle hides in 1924–5 was £1·99, of calf-skins 9*s.* 3*d.*, and of de-wooled sheep and lamb skins 4*s.* 3*d.* Using these averages, which are based on weekly prices in the hide and skin markets. . . ." Would that value include the transport from the place of slaughter to the market? If so, it was not the value of the hide as a by-product at the place of production.

Another point which arose was the extent to which the price was affected by the ravages of the warble-fly. Did the average market price include the price of affected hides, and if so did seriously affected hides come on to the market? Could any allowance be made for hides so injured by the warble-fly as to have no marketable value ?

MR. R. J. THOMPSON said there were one or two questions he would like to ask Mr. White. The first was whether he could give any further explanation of the very noticeable increase in the demand for hides which took place in 1927–8. On looking at Diagram D, and indeed all through the paper, it would be seen that the hide price-index rose very sharply in the latter part of 1927 and continued high during the whole of 1928. This apparently drew out supplies of raw hides and resulted in greater production of leather in these two years. It seemed to show a considerable development in demand for that period.

In the concluding sentence of his paper Mr. White mentioned that there was a rise of 28 per cent. between 1926 and 1927–8 in the international trade in hides, and a fall of 28 per cent. in the subsequent years, and it would be of interest to know why there was this exceptional increase both in demand and supply and in price in those two years. The only note of explanation in the paper was that in 1927 Russia was buying very considerably.

In the appendix, Mr. White pointed out how very greatly these ingenious calculations of live-stock slaughter were dependent upon the accuracy of the estimates of the births and deaths of cattle, and the age classifications. There was no doubt that this was perfectly sound criticism, and it had always been recognized. In fact, in the agricultural census for 1925 it was stated that this method of estimating the number of animals slaughtered and the quantity of meat produced, was only put forward in default of any better system: not as a very desirable method, but as the only one available in present conditions. It had been suggested by Mr. White, although he did not actually say so, that these approximations as to the number of animals slaughtered might be improved by an attempt to make annual estimates of the probable births and deaths based on the character of the seasons, instead of the fixed figures which were now used. That was a very sound suggestion, and one which might be considered by the Ministry, but the difficulty probably was that it was not easy to make accurate annual estimates.

Mr. Thompson wondered if Mr. White had actually verified the statement on p. 486, viz., "The number of births of lambs in England and Wales is taken to be 118 per cent. of the number of ewes at the end of the year." The Ministry certainly made an annual estimate of the actual births of lambs, and he was under the impression that this was used in calculating the total amount of meat production instead of using the same percentage every year. If it were possible to adopt the same method for cattle it would no doubt add something to the accuracy of the figures.

MR. T. W. WYATT said that in this paper, which he had read with great interest, an endeavour had been made to get some idea of the total value of the industry to the country, and in 1924 a final total of £121 million was recorded. In Table V the hide price index figure in December is given as 112 and the Board of Trade Index of Wholesale prices as 102·4. In spite of very remarkable variations it was shown that eventually leather and hides were compelled to fall into line with other wholesale prices, and in December 1931 the hide price index was 65 and the wholesale price index 63·7.

A previous speaker had emphasized the loss to the industry caused by the warble-fly, but this was very small indeed compared with this drop, and it might be as well if when the Society considered reviewing other industries they would also consider the question of reviewing industries generally and the reason why prices had fallen in this catastrophic manner. If this could be done it would be of great advantage to trade and industry generally.

MAJOR WARMAN said he had read the paper with the greatest interest, because he did not think it was generally understood how important this industry was to the country. As he was himself interested in the meat trade of Great Britain, he was much impressed with the size and the value of the by-products which arose, in a way, from that trade.

He would like to say a word with regard to waste. It would be seen from the figures given that what was of comparatively small value in the hands of the farmers or butchers assumed a large value when it came to the retail trade, and formed a large portion of the country's income, which meant that any waste in this industry was multiplied many times when it came to the final value.

The proposer of the vote of thanks had referred to the waste arising from the number of private slaughter-houses in the country. Probably that was the main reason. There were about sixteen thousand private slaughter-houses in the country, and only about one hundred public abattoirs, and an enormous amount of waste undoubtedly occurred through that dispersion of slaughtering. The farmers could not be held entirely free from blame in connection with waste, and some measures ought to be taken by the farming community. Probably the evil caused by the warble-fly was less than that occasioned by waste. In the case of flaying, the Ministry of Agriculture estimated that in private slaughter-houses probably 60 per cent. of the first-grade hides were put down to second grade owing to bad flaying. Even in public abattoirs the standard in this country was so low that probably 40 per cent. of first-grade hides were put down through bad flaying. That was a wholly unnecessary loss to the industry. It was worse at the present time, because as the value of the final product went down, so the care of people handling it diminished. Previously, bonuses had been paid to good workmen for proper handling, but now these bonuses had been reduced. The same thing applied to fat and other by-products. He had recently seen two examples of fat, one manufactured by a firm getting its fat from a public abattoir, and another by a firm under the same management, but collecting its fat from private slaughter-houses in the same city. There was no comparison in the quality of the fat. This waste could undoubtedly be done away with, and it should be possible to get a great deal more raw material which could be worked up into valuable products.

There was another point in connection with the question whether the price of hides had any effect upon the price of production. They had been hearing about a rise in price tending to increase production, but in practice recently there had been more to do with a fall in prices. In 1928 the actual figures for hides and offal from a beast at Smithfield came to £4 15*s*. 0*d*., of which £2 19*s*. 0*d*. represented the hide. At the present moment the total figure was £2 10*s*. 6*d*. So large a difference was definitely material in live cattle prices. Professor Jevons had referred to a position in which this was countered by a rise in the price of meat, but such a thing was not possible under present conditions. The price of meat had fallen, as well as that of hides, and a fall of that kind was sufficient to have an influence on production.

Major Warman then referred to the percentage of raw material at present recovered. There the figure, when compared with American figures, was still worse than formerly. It had been suggested that the by-products represented about one-sixth, whereas at the present moment the best figure was about ¾*d*. per pound. Although the American figure was not now as high as that referred to in the paper, it was no doubt somewhere in the region of one-fifth. It should be possible, by better arrangement, to obtain a comparable figure.

The paper had shown this matter to be one of great and vital importance, and the attention directed to the industry was most valuable.

DR. E. C. SNOW referred to the appendix dealing with the question of the calculation of the slaughter of cattle in this country, a point which had been raised by Mr. Thompson. He said that when some years ago he first had occasion to enquire into the number of cattle slaughtered in this country annually he had been rather amused at the formula employed. He had previously worked on the statistics of the Registrar-General dealing with the ages of the human population of the country and had had a good opportunity of becoming aware of the deficiencies of the returns made by the human population of its ages. The particular method of estimating the slaughter of cattle in this country depended upon a knowledge of the ages of the cattle, the farmer being required each June to state the number under one and the number between one and two on a particular date. He wondered whether the farmer was more likely to give the age of his cattle correctly than his wife was in giving her own age in the Census returns, and he felt a little bit sceptical about the accuracy of the calculations based upon these kinds of data. Subsequently he was able to get a fairly accurate idea of the actual slaughter in this country through particulars of the number of cattle hides available for tanning, and it was satisfactory to find that the formula gave results which were in fair accordance with the data directly collected.

The subject of the relationship between consumers' stocks and producers' stocks of the same article, referred to by Mr. White, was, he thought, worthy of much more consideration than had hitherto been given to it. There was a certain amount of evidence available on this subject in the leather industry, and he thought it would considerably enlighten discussions in economics if the same sort of data were available more generally. In America, where particulars were available of both producers' and consumers' stocks of leather, they found a clear relationship between falling prices and an increase in producers' stocks, and rising prices and an increase in consumers' stocks. In this country they only had particulars of the producers' stocks, but there was no doubt about the close association between these and the upward and downward movement of prices. It would undoubtedly be most useful if it were possible to ascertain to what extent in periods of good trade there was actually an increase in the amount of an article definitely consumed, and to what extent good trade was caused by an increase in the stocks of consumers due to rising prices. From about 1895 to the outbreak of the war, in the leather industry prices were continually rising and trade was good. Each year consumers held more and more stocks because they found that whatever they bought at the beginning of the year had increased in value by the end of the year. It did not necessarily follow that the amount of leather worn out per head of population had increased, and it was possible that what constituted the good trade of that period was mainly the increase in stocks in consumers' hands. When the tide of prices changed it is possible that consumption per head still went on at the same rate, but trade became bad simply because the consumers were able to live on their stocks, and all through a period of falling prices merely purchased the minimum amount necessary to pass on to their customers.

Dr. Snow thought that Diagram A on p. 467 showing the movements of the index of hide prices over the past few years was extremely interesting, as indicating how extraordinarily speculative a manufacturing industry might be which depended upon a raw material whose price fluctuated so violently. The index of prices in that diagram reached a level of 170 early in 1928 and had now fallen to a figure of only 44, or about one-fourth of the highest figure used. All through this period the tanner had had to spend three-quarters of his capital in buying hides, and it was a matter of six or eight months after buying the hides before he sold his leather, and throughout this period his stocks in process showed a continuous depreciation. He thought it was Sir Henry Strakosch who some time ago had expressed the view that manufacturers who had kept their heads above water in the circumstances of the past few years were national heroes, and a diagram such as that given by Mr. White illustrated the extraordinary troubles to which manufacturers were subjected by reason of large changes in prices.

It was often assumed that the problem of making prices stable was a problem of getting the curve showing the index-number of wholesale prices horizontal. It was not. Even if the index-number of wholesale prices was constant there would be wide fluctuations from stability in the cases of individual articles, and the problem of stability from the point of view of the manufacturer was of flattening out the peaks and depressions in the price curves of individual commodities.

Professor Jevons had referred to Mr. White's sentence about the increase in the demand for hides not adding a single hide to the world's supply. What was meant was that an increase in the demand for hides did not result in the birth of any more cattle, though it might result in some of the inferior hides in outlying parts of the earth coming on to the market.

The question had been asked about the reason for the sudden rise in hide prices in 1927 and 1928, and that point was worthy of more study. In his opinion a number of factors were operating, but the chief one was the ease of the money market at the time and the lending of considerable sums of money to Germany. It so happened that Germany at that time was not well supplied with leather or hides, and was able to buy unusually freely as a result of the loans. This was a commodity in which stocks were not held in large quantities in merchants' and producers' hands; there was a rush for supplies and prices went up. At the same time Russia, who had not been a big hide buyer in previous years, started buying on a substantial scale. It was not easy at the time to diagnose the symptoms accurately and a number of people thought that there was a real shortage of leather in regard to the general demand, but it was now clear that this view was erroneous.

MR. DUCKHAM pointed out that hides were not always by-products. In Africa and other parts of the world the production of hides might be the only cattle product. As he had himself been working on the same sort of job as Mr. White, he fully appreciated the amount of work and ingenuity put into the paper. There were, however, one or two questions he would like to ask.

As far as he could make out, Mr. White inferred that the hides and skins were recovered from all the animals that died in this country, but in reality if the point were fully investigated this would not be found to be the case. Mr. White's estimate for the available supply of "fallen" hides and skins was therefore probably too high.

Mr. White stated that $R_N + V_N + V_I$ equalled the contribution of the animal by-product industries to the national income, and he pointed out that it was not possible to determine R_n with any degree of accuracy. Mr. Duckham agreed, but thought a rough estimate of R_n on the basis of 1924 prices was possible. The value of animal offals, other than hides and skins, might be taken very roughly as follows:—

Pigs	9*s*. 6*d*.	per head.
Sheep and lambs . .	6*s*. 0*d*.	,,
Cattle	35*s*. 0*d*.	,,
Calves . . .	5*s*. 0*d*.	,,

Multiplied by estimated slaughterings these figures gave a total of £8·3 million for offals other than hides and skins. The total for hides and skins (including the wool on sheep and lamb skins) amounted to about £7·7 million in that year, and to that must be added the value of "fallen" skins, making a total of about £16·3 million. This figure, however, included a certain added value due to transport and processing, leaving a figure something like £15 million for the value at the point of production of animal by-products in 1924. If one could only get the manufactured value of all animal by-products, both edible and inedible—at present almost impossible— it would be found that the value for $R_N + V_N + V_I$ would be considerably larger.

Major Orme said he would like to make one comment on the paper, which was that on p. 458 Mr. White had called attention to the fact that it had been found extremely difficult to obtain the actual values of the by-products of animals in the form in which they were first obtained after the slaughter of the animals, and he went on to suggest that the Commission made no attempt to estimate the relative importance of the by-products or the industries depending upon them. Probably this Federal Trade Commission of the U.S.A. was in exactly the same position as were many people in this country when they tried to arrive at an estimate of what the value might be. The value differed not only between person and person but also between one class of trade and another, in the sense that the value of these by-products, where sold wholesale, was distinctly less than it was in the case of the small scale establishments. One could easily realize how difficult it was to obtain any figure that could be regarded as anything like an approximate estimate.

At the Ministry they had come to the conclusion that of the total value of the carcase the value of the by-products in the case of cattle represented about one-sixth. That figure was based upon the wholesale value of the estimated number of cattle slaughtered in the country. It really represented the value of what the by-products would be if all cattle were slaughtered in the proper manner, but unfortunately, as had been pointed out, that was not the case. That was another reason why it was difficult to get at the starting point.

A great deal had been heard about the waste that took place up and down the country; reference had not been made, however, to the extraordinary custom in Northern Ireland, and the West of Scotland where in the course of a year thousands of pigs were slaughtered on the farms. The usual thing was for the slaughter to take place on the farms and the carcase to be sold to bacon-curers, the farmer sticking to the offal, or the slaughterer taking the offal as a reward. The average waste in such cases was enormous, and it was still going on, because it had been found absolutely impossible to introduce a better and more economical system.

Major Orme concluded by congratulating Mr. White on his most able and interesting paper, in which he was sure his colleague, Mr. Duckham, who was now engaged in preparing a Report on the marketing of hides and skins, would find much food for thought.

Mr. White, in reply, thanked the meeting for the way in which they had received his paper and said that in view of the late hour he had been requested to defer his reply to the discussion until the publication of the *Journal.* The following reply has since been received from Mr. White:—

A number of the points raised in the discussion were adequately dealt with by later speakers, and it only remains for me to reply to the others. In the first place, I should like to thank Major Warman and Mr. Duckham for their data regarding the value of the raw by-products, thus supplementing a section of the paper for which I found it extremely difficult to obtain reliable figures.

Mr. Bradley raised a very interesting point with regard to the consumption of tanning materials. He pointed out that the German figures showed that only a half to two-thirds of the vegetable tanning materials used by the leather industry are actually taken up by the raw material, the remainder apparently going to waste. Estimates of consumption of tanning materials in the United Kingdom and of the production of hide leather have led me to the conclusion that, although there is an appreciable margin between the former figures and those obtained by taking 37 per cent. of the production of hide leather by weight, the margin is not so great as in the case of the German figures.

In arriving at a value for the hides and skins from animals sold for slaughter I made use of average values based on weekly prices in the hide and skin markets. These values would include the cost of collection and transport, and to that extent the total arrived at would be an over-statement of the value at the place of production, *i.e.* the slaughter-house; but since my object is merely a rough comparison with the total value of the live-stock sold for slaughter, the error introduced is not a serious one. Several speakers referred to the question of the losses caused by warble damage and bad flaying. The average market prices take into account the damage due to both these causes, and it may be of interest to add that the total loss to the country on this account amounts to upwards of £1,000,000 a year.

Referring to the estimate of live-stock slaughter, Mr. Thompson enquired whether I had verified the statement that the Ministry of Agriculture uses the same figure of 118 per cent. each year for estimating the number of births of lambs. I conclude that they must do so, since by using this figure I arrive at the identical figures of slaughter published by the Ministry. I am certainly surprised that the Ministry do not make further use of the additional annual data they collect in this connection.

In utilizing the Census of Production data I was fully aware of the danger of introducing duplication, and, in spite of my efforts, I appear to have overlooked one case, namely glycerine. I am grateful to Mr. Flux for pointing this out. Unfortunately the Census of Production report did not attempt to give a single figure free of duplication for glycerine, but I have added a footnote to the table drawing attention to the duplication involved.

As a result of the ballot taken during the meeting, the candidates named below were unanimously elected Fellows of the Society:

Frank Henry Biddle.
George Livingston Craik.
Gordon Cushing.
Hugh Somerville Lanphier.
Hector Leak.
Mohammed Ali Rifaat.

MISCELLANEA.

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RECENT ADVANCES IN MATHEMATICAL STATISTICS (1931).

By J. O. IRWIN, M.A. D.Sc.

(Division of Epidemiology and Vital Statistics, London School of Hygiene and Tropical Medicine.)

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THERE has been a considerable increase in the volume of mathematico-statistical literature in the past year. This article is intended to cover the year 1931, but a certain amount of overlap is inevitable and no hesitation is felt in quoting earlier literature where this is relevant to the subject.

I. *Semi-invariants of Sampling Distributions and Related Topics.*

A reprint of Thiele's *Theory of Observations* has appeared in the *Annuals of Mathematical Statistics* (A 80), and mathematical statisticians will be grateful for once more having this classical work readily available. The introduction of semi-invariants can only be regarded as one of the most epoch-making discoveries in mathematical statistics even if this was not realized at the time, and when one considers the early date (1889) when the *Almindelig Iagttagelseslaere* was published, one appreciates the achievement even more.

Thiele considered, among other things, the problem of obtaining the sampling distributions of semi-invariants, and it may help to clear up some current confusions if we consider carefully what he did.

Thiele used the notation λ_r to denote the rth semi-invariant of the population (supposed infinite), and the notation μ_r for the same function of the sample observations as λ_r is of the population observations. For the mean value of μ_r in all possible samples, or the mathematical expectation, which we would now write $E(\mu_r)$, he wrote $\lambda_1(\mu_r)$.

He found

$$\lambda_1(\mu_2) = E(\mu_2) = \frac{m-1}{m}\lambda_2$$

$$\lambda_1(\mu_3) = E(\mu_3) = \frac{(m-1)(m-2)}{m^2}\lambda_3$$

$$\lambda_1(\mu_4) = E(\mu_4) = \frac{(m-1)}{m^3}[(m^2-6m+6)\lambda_4 - 6m\lambda_2^2] \quad . \quad . \quad (1)$$

m being the size of sample.

Solving these equations he obtained

$$\lambda_2 = \frac{mE(\mu_2)}{m-1}$$

$$\lambda_3 = \frac{m^2E(\mu_3)}{(m-1)(m-2)}$$

$$\lambda_4 = \frac{m^3}{(m-1)(m^2-6m+6)}\left[E(\mu_4) + \frac{6}{(m-1)}\{E(\mu_2)\}^2\right]. \quad . \quad (2)$$

Now, in practice, we have usually only observed one sample and we do not know the value of $E(\mu_2)$, $E(\mu_3)$, $E(\mu_4)$ any more than we know the values of λ_2, λ_3, λ_4. Thiele proposed to estimate λ_2, λ_3, λ_4 by substituting μ_2, μ_3, μ_4 for $E(\mu_2)$, $E(\mu_3)$, $E(\mu_4)$ in the above expressions. This was somewhat unfortunate, as although the process is satisfactory for λ_2 and λ_3, it is not so for λ_4 and higher semi-invariants. A satisfactory estimate should be unbiassed, that is to say, its mathematical expectation should be equal to the quantity estimated. This will not be the case if λ_4 and the higher semi-invariants are estimated in the manner proposed by Thiele. This difficulty has been noted by Steffensen (C 17), by Lidstone (C 11) and by Wishart (A 88). It is, however, surmounted if we use R. A. Fisher's "k-statistics" or cumulants (C 8), which are estimates made from the sample of the population semi-invariants, their mathematical expectation being equal to the quantity estimated. Fisher, as was mentioned in our last article, has worked out the semi-invariants of the sampling distributions of these "k-statistics." The point is of some importance, as an American writer (C 10), noting the resemblance to

Thiele's results just quoted of Fisher's formulæ defining k_1, k_2, k_3, k_4 in terms of the moments of the sample, viz.—

$$k_2 = \frac{nm_2}{n-1}$$

$$k_3 = \frac{n^2}{(n-1)(n-2)} m_3$$

$$k_4 = \frac{n^2}{(n-1)(n-2)(n-3)} \{(n+1)m_4 - 3(n-1)m_2^2\} \quad . \quad (3)$$

(where m_2, m_3, m_4 are the 2nd, 3rd and 4th moments of the sample about its own mean, n the size of sample), was led into the error of suggesting that Thiele anticipated Fisher. It is, as a matter of fact, true that Fisher's k_2 and k_3 are identical with Thiele's estimates of λ_2 and λ_3, but Thiele's estimates for λ_4 and the higher semi-invariants are *not* unbiassed. Further, the definition of the "k-statistics" was only the beginning of Fisher's work, the real purpose of which was to obtain the semi-invariants of the sampling distributions of these estimates. Thiele's contribution to this problem in *The Theory of Observations* was limited to giving the first four semi-invariants of his μ_2, the first two semi-invariants of his μ_3 and μ_4, and the mean values of his μ_5, μ_6, μ_7, μ_8. This was a very great achievement at the time when his work was written, but it is a matter of considerable interest to see just how far Thiele went, and just how far beyond him later writers have advanced.

Recent contributions to the theory of the semi-invariants of sampling distributions include two papers by Craig. In one paper (A 14), using general formulæ previously obtained by him (C 3) for the semi-invariants of moments, Craig discusses the case of the semi-invariants of the moments of sets of N correlated observations. He shows in particular that if the population sampled is normal and the correlation between every pair of observations is equal, then the characteristics of the samples of N in this particular case of dependent observations are the same as if the observations were independent and taken from a normal population of variance $(1 - r)\lambda_{20}$, λ_{20} being the variance of the population sampled. He also discusses the case where only consecutive observations are correlated, the correlation between each pair being the same, and in addition to the results for the mean and variance of the second moments about the mean of the sample, obtained by Rhodes (C 15), he also obtains the third moment (or semi-invariant) of the variance and the mean and variance of the third and fourth moments about the mean.

In the other paper (A 13) Craig discusses the following problem: Given a general linear form

$$a_1x_1 + a_2x_2 + \ . \ . \ . + a_nx_n$$

of a set of statistical variables $x_1, x_2 \ldots x_n$, it is well known, if the variables are independent in the sense of the theory of probability, that the r'th semi-invariant of this form is

$$a_1{}^r\lambda_r{}^{(1)} + a_2{}^r\lambda_r{}^{(2)} + \ldots + a_n{}^r\lambda_r{}^{(n)} \quad . \quad . \quad . \quad (4)$$

Are there any other isobaric functions of the moments besides the semi-invariants which possess this property? Craig shows that in general there are not. But if any semi-invariant of lower order than r vanishes for each of the independent variables there will be an infinity of isobaric functions of weight r possessing the property. The conclusion is put by him rigorously as follows:

"The necessary and sufficient condition that more than one isobaric function of weight k of the moments of the probability variables $x_1, x_2 \ldots x_n$ exists which has the semi-invariant properties in question, is that the probability functions of $x_1, x_2 \ldots x_n$ in case of independence are such that for some $r < k$, λ_r vanishes for each of them."

An interesting paper on Symmetric Functions has been written by O'Toole (A 54). The paper is a thesis submitted for the degree of doctor of philosophy in the University of Michigan and is on the whole didactic rather than original. Perhaps this is why no reference is made to MacMahon, although many of the results given are to be found in his classical work (C 12). However, O'Toole gives a direct method, which appears to be new, of arriving at expressions for the monomial symmetric functions in terms of the power sums without the intervention of the unitary symmetric functions. A monomial symmetric function of weight w can be expressed in the form

$$(a^\alpha b^\beta c^\gamma \ldots) = f(s_1, s_2 \ldots s_w) \quad . \quad . \quad . \quad (5)$$

where s_r is the rth power sum.

Introducing a new variate k changes the left-hand side into

$$(a^\alpha b^\beta c^\gamma \ldots) + k^a(a^{\alpha-1}b^\beta c^\gamma) + k^b(a^\alpha b^{\beta-1}c^\gamma + \ldots)$$
$$+ k^c(a^\alpha b^\beta c^{\gamma-1} + \ldots) + \ldots \quad . \quad . \quad . \quad (6)$$

and the right-hand side into

$$f(s_1 + k, s_2 + k^2, \ldots s_w + k^w) \quad . \quad . \quad . \quad (7)$$

This expression may be expanded in the form

$$\sum_{r=1} \Bigl(\sum_{u=1} k^u \frac{\partial}{\partial s_u} \Bigr)^r \frac{f}{r!} \quad . \quad . \quad . \quad . \quad (8)$$

or on collecting powers of k—

$$f(s_1 + k, s_2 + k^2 \ldots s_w + k^w) = \sum_{r=1}^{w} k^r D_r f$$

where

$$D_r = \sum \frac{d_a{}^A d_b{}^B d_c{}^C \ldots}{A!\,B!\,C!\ldots} \Bigl(d_\nu = \frac{\partial}{\partial s_\nu} \Bigr) \quad . \quad . \quad . \quad (9)$$

A, B, C being such that $aA + bC + cC + \ldots = r$, the summation being extended over all positive integral values of a, b, c, A, B, C which satisfy this condition.

Equating coefficients of k in (6) and (7) now gives

$$\begin{aligned} D_a(a^\alpha b^\beta c^\gamma \ldots) &= a^{\alpha-1} b^\beta c^\gamma \ldots \\ D_b(a^\alpha b^\beta c^\gamma \ldots) &= a^\alpha b^{\beta-1} c^\gamma \ldots \\ D_r(a^\alpha b^\beta c^\gamma \ldots) &= 0 \text{ if } r \text{ is not among } a, b, c \quad . \quad (10) \end{aligned}$$

Using these operators it is now easy to express any monomial symmetric function in terms of the power sums. For example, take (31^2). We assume

$$(31^2) = a_1 s_1{}^5 + a_2 s_1{}^3 s_2 + a_3 s_1{}^2 s_3 + a_4 s_1 s_2{}^2 + a_5 s_1 s_4 + a_6 s_2 s_3 + a_7 s_5 \quad . \quad . \quad (11)$$

By operating on the right-hand side with $d_1{}^2$, $2d_2$, $4d_4$ and $5d_5$ and on the left-hand side with the equivalent expressions in terms of the D's the "a" coefficients are easily determined. The author uses his symmetric function theory to prove the general formula given for the moments of the sampling distribution of the sample totals or means given by Carver (C 1) and mentioned in our last article.

II. χ^2 *and Related Topics.*

A paper by J. Neyman and E. S. Pearson (A 52) must be read in the light of other research done on the χ^2 test in recent years. This has largely turned on the modifications to be made in Pearson's fundamental method when the expected quantities (frequencies in a curve-fitting goodness-of-fit test) are not known " a priori " but must be estimated from the data. R. A. Fisher (C 5) was the first to point out that in the latter case, while under certain conditions the form of the χ^2 distribution remained unaltered, Elderton's Tables should be entered with a value of n' equal to one more than the degrees of freedom of the system, the distribution of χ^2 being, in fact,

$$C\chi^{n'-2} e^{-\frac{1}{2}\chi^2} d\chi \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (12)$$

The conditions that this should be so are bound up with the method of estimation of the parameters by which we specify the hypothetical population from which the expected frequencies * are in their turn calculated. In investigating these conditions Fisher (C 4) first found that the value of χ^2 obtained by estimating the parameters by the method of maximum likelihood tended with increasing size of sample to be the same as that obtained when we estimate the expected frequencies by making χ^2 a minimum. Later (C 6), he pointed out that if the parameters are estimated by the method of maximum likelihood, χ^2 tends in large samples to have the above distribution and gave the proof explicitly for the case of a single parameter. The importance of this discovery was increased by the fact that he had previously shown (C 4) that if a "statistic" or estimate of a parameter made from the data was efficient, *i.e.* such that its standard deviation in large samples was a minimum, such a statistic could be found by the method of maximum likelihood, all efficient statistics being equivalent for large samples. (A later proof of this property given in (C 7) is perhaps more convincing.) Thus any efficient estimate of the parameters will result in χ^2 having the above distribution.

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* We need consider here only the case when the expected quantities are frequencies.

It was rather long before Fisher's condensed reasoning was understood, and the next important paper on the subject was that of Sheppard (C 16), which confirmed Fisher's previous conclusions. But Sheppard, who gives perhaps the best analytical treatment which has yet appeared, arrived at a new property. In his notation, if we are applying a goodness-of-fit test to $(m+1)$ frequency groups and k parameters are estimated from the data, then we have $m-k$ independent* discrepancies, a discrepancy being the difference between our estimate of the theoretical class frequency and its observed value. Now Sheppard showed that if the sample is sufficiently large for the discrepancies to be regarded as linear functions of the errors (or differences between the true theoretical frequencies and their observed values), if, further, $\theta_{k+1}, \theta_{k+2}, \ldots \theta_m$ be any $m-k$ independent discrepancies estimated by what he calls any correct method, or what Fisher would call any consistent method, that is to say, one which would give the correct values of the parameters if there were no errors in the frequencies, and if $\chi'^2 = \Theta^{\pi\sigma}\theta_\pi\theta_s$ be calculated, then χ'^2 will be distributed as (12) with $n' = m-k+1$. In this expression tensor notation is used, *i.e.* where a suffix is repeated the expression is supposed summed for all values of that suffix. Here Θ_{ps} is the mean product of θ_p and θ_s and if the $m-k$th order determinant of which the typical element is Θ_{ps} is formed and denoted by Δ, Θ^{ps} is the co-factor of Θ_{ps} divided by Δ. Sheppard gave a striking numerical example, by constructing an artificial population of 300,000 individuals containing errors in its six frequency groups. He fitted the normal curve by estimating the mean and standard deviation from a knowledge only of the cumulative total of the first four and first five frequency groups; then repeated with the first two cumulative frequency groups. The two values of

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* Independent in the sense that there are no algebraic relations between them, not in general independent in the sense of the theory of probability.

χ'^2 obtained differed only by 1 in the third decimal place (the values were 5·229 and 5·230).

It must, however, be borne in mind that in order to calculate accurately Θ_{p_s} we require to know the true values of the parameters; as approximations to these Sheppard uses what he calls their most probable values, or those obtained by the maximum likelihood method of Fisher. If we know the maximum likelihood values we can calculate the ordinary χ^2 expression (called by Sheppard χ_s^2) with the estimates of the expected frequencies based on these values. Sheppard actually did this and found a value differing from χ'^2 by about one part in 500. This, as stated above, confirmed Fisher's conclusion. Thus Sheppard's χ'^2 is only of theoretical interest. For while it is important to know that any method of consistent estimation will lead us to a χ'^2 with the right distribution, yet χ'^2 can only be calculated exactly when we know the true values of the parameters, and if for these are to be substituted their most likely values there is a simpler method of treatment. The agreement between χ'^2 and χ_s^2 in the numerical example was the most important result of this investigation as confirming the supposed theoretical distribution of the latter. Sheppard further proved that χ'^2 was equal to χ_s^2 for contingency tables.

Neyman and E. S. Pearson (C 13) were the next important contributors; they supposed the estimated theoretical frequencies to be determined by making χ^2 a minimum and showed that under certain general conditions χ^2 then has the distribution (12). The value of χ^2 so obtained they called χ_1^2 to distinguish it from the Pearsonian χ^2 calculated from the true theoretical frequencies. In Neyman and Pearson's notation the observed proportional frequencies are q_s, the true proportional frequencies are p_s, and the estimates of the latter made from the data π_s. If there are c parameters (α_1, $\alpha_2 \ldots \alpha_c$) to be determined from the data, they pointed out we may write

$$\pi_s = p_s + \underset{t=1}{\overset{c}{S}} \{a_{st}(\alpha_t - \alpha_t^0)\} + \phi_s(\alpha_1, \alpha_2 \ldots \alpha_c) \quad . \quad . \quad (13)$$

while the true value of χ_1^2 when we have n' frequency groups, is

$$N \underset{s=1}{\overset{n'}{S}} \left\{\frac{(\pi_s - q_s)^2}{\pi_s}\right\} = \chi_1^2 \quad . \quad . \quad . \quad . \quad . \quad (14)$$

They showed that if the quantities π_s are determined so as to minimize χ_1^2, then the probability integral required is

$$z = C\int\int\int \quad . \quad . \int_E e^{-\frac{1}{2}\chi^2} dq_1 dq_2 \ldots dq_{n'-1} \quad . \quad . \quad (15)$$

where the region of integration is that inside the envelope of the surfaces (14) subject to the conditions (13), χ being given by

$$\chi^2 = N \overset{n'}{\underset{s=1}{S}} \frac{(p_s - q_s)^2}{p_s} \quad . \quad . \quad . \quad . \quad . \quad (16)$$

where C is a constant such that $z \longrightarrow 1$ as $\chi_1 \longrightarrow \infty$. They prove that if the π's of (13) are such that

$$\pi_1 + \pi_2 + \ . \ . \ . + \pi_{n'} = 1, \ \overset{n'}{\underset{s=1}{S}} (\pi_s - p_s)^2 = \rho^2$$

where

$$Lt\, \rho \longrightarrow 0 \{ \overset{s=n'}{S} \phi_s^2/\rho^2 \} = 0 \quad . \quad . \quad . \quad . \quad (17)$$

Then as $N \longrightarrow \infty$,

$$Lt\ z = \frac{\int_0^{\chi_1} \chi^{n'-c-2} e^{-\frac{1}{2}\chi^2} d\chi}{\int_0^{\infty} \chi^{n'-c-2} e^{-\frac{1}{2}\chi^2} d\chi} \quad . \quad . \quad . \quad . \quad (18)$$

The condition (17) implies that when the parameters α of the fitted curves tend to the population values α^0, the functions ϕ tend to become indefinitely small compared with ρ.

Neyman and Pearson also gave the joint distribution of χ^2 and $\chi_1{}^2$ and found a good agreement between observation and theory in fitting a third order parabola to 200 observations using eight groups. They actually took 208 samples of 200, and found χ^2 and $\chi_1{}^2$ for every one and compared the observed and theoretical distributions. This experimental work is very important at the present stage because the distribution (12) only tends to become exact with increasing size of sample, and then only if efficient estimates of the parameters are used in fitting. Little is known of the error in using the distribution for small samples; as regards the latter condition Fisher (C 6) has shown that the mean value of χ^2 calculated from an inefficient statistic is greater than that obtained from an efficient statistic by $\frac{1}{E} - 1$ where E is the efficiency of the inefficient statistic. (The efficiency of a statistic is the inverse ratio of its variance to the variance of an efficient statistic.) We have, however, no precise information as to the change in the form of the χ^2 distribution caused by the use of inefficient statistics.

The present note of Pearson and Neyman (A 52) considers from the point of view of experimental sampling—

(i) The effect of clubbing together frequency groups after the process of fitting has been carried out.

(ii) The distribution of χ^2 in very small samples.

As regards (i) the process is found to result in the observed distribution of χ^2 having an excess of very small values as compared with expectation, but the authors conclude that the error involved will probably not be large if, as is customary, the groups which are combined contain only a small portion of the total frequency. As regards (ii), the authors have supposed repeated samples of 10 to be taken from a population divided into three groups, $p_1 = 0{\cdot}2$, $p_2 = 0{\cdot}5$, $p_3 = 0{\cdot}3$. They have worked out the actual chance of occurrence of each of the 66 possible samples, then for each of them the chance of a sample less likely than the one under consideration, and compared the results given by the χ^2 approximation. They find the approximation to be much more satisfactory than might have been expected. The probabilities are always of the same order of magnitude and only in eight cases out of the 66 could the discrepancies be considered serious.

A recent paper by the late Von Bortkiewicz (A 83) on "The Relation between Stability and Homogeneity" may be conveniently discussed in relation to the theory of χ^2. Von Bortkiewicz discusses the relations between the Lexian coefficient Q calculated for the whole of a body of data and the Q's which may be calculated from constituent parts of such data. For example, if we wish to discuss whether the variation of suicides in time over the whole of Germany is greater than would be accounted for by random causes we may calculate Q; equally we might perform the same calculation for the various German provinces separately, and the relations between the sets of Q's so calculated are a matter of considerable interest. The author also deals with a quantity related to Q which he calls β. This is really the same as Charlier's "coefficient of disturbancy" and is most simply defined by the formula

$$\beta = \frac{\sqrt{\sigma^2 - \sigma_B{}^2}}{M}$$

where $\sigma_B{}^2$ is the variance the series would have if it were Bernoullian, *i.e.* merely a set of numbers varying randomly about their mean, and M is that mean. Strictly the true population values should be used for $\sigma_B{}^2$ and M, for these the observed values are substituted in practice. Von Bortkiewicz finds that the β obtained from the aggregate data is always less than the average β obtained from the constituent parts, except when there is perfect correlation between every pair of constituent series when the two are equal. This he expresses by saying that the aggregate is more stable than the average of its parts. Now at any moment of time an element of the aggregate series can be regarded as being composed of a number of elementary components; so can each of its constituent parts. Clearly the variance of the elements of the aggregate series at this moment of time can be split up into two portions, one corresponding to the variance within the constituent parts and the other to the variance from part to part; thus the variance of the whole is greater than the average variance of its parts except in the case of complete homogeneity. The author emphasizes this principle that the whole is more stable but less homogeneous than the constituent parts, and as a practical example gives the case of three fire insurance companies, A, B, C. A insure only dwelling-houses, B only factories, while C insures both. The premiums in A, B and C are different because of the different classes of risk. It is assumed in C that there is no grading of premiums, but that a premium per unit is charged which is calculated according to the relative numbers of the two risks. The premium is to be just high enough so that for a period of years, allowing for variations due to chance, the damages are just covered. In the course of the period the danger of fire varies from year to year, showing gains in some years, losses in others. Then the insurance company C would show relatively smaller fluctuation of fire damage from one year to another, resulting in a more stable business than will be shown by the average of A and B.

The connection between Q^2 and χ^2 has perhaps been insufficiently appreciated and a clear understanding of it may help readers for whom the latter is the more familiar conception. If we have a series of values (say numbers of suicides at different periods) $x_1, x_2 \ldots x_\kappa$, and these may be regarded as samples from a population in which the true mean is m where $m = sp$, s being the population exposed to risk and p the probability of a suicide, then

$$Q^2 = \frac{\frac{1}{\kappa}\overset{r=k}{\underset{r=1}{S}}(x_r - m)^2}{spq} \quad . \quad . \quad . \quad . \quad . \quad . \quad (19)$$

will have a mathematical expectation of unity if the probability of a suicide is constant from period to period. If, on the other hand, the probability of a suicide varies from period to period, the average value of p being substituted in the formula, the mathematical expectation of Q will be greater than unity. In practice the values of m, p and q are estimated from the data and Q used to test whether the series is random or not. On the other hand, the expected value of x_r on the hypothesis of constant probability is m, and the expected value of $s - x_r$ (or those who do not commit suicide) is $s - m$, so that we may test the hypothesis by calculating

$$\chi^2 \doteq S\frac{(x_r - m)^2}{sp} + S\frac{(s - x_r - (s - m))^2}{sq} \quad . \quad . \quad (20)$$

and applying the χ^2 test with κ degrees of freedom, this value of χ^2 reduces to

$$\frac{S(x_r - m)^2}{spq} = \kappa Q^2 \quad . \quad . \quad . \quad . \quad . \quad . \quad (21)$$

so that Q^2 and $\frac{\chi^2}{\kappa}$ are equivalent.

If m, p, q be estimated from the data we have

$$\chi^2 = \frac{S(x_r - \bar{x})^2}{\bar{x}\left(1 - \frac{\bar{x}}{s}\right)} \quad . \quad . \quad . \quad . \quad . \quad . \quad (22)$$

and the test should be applied with $\kappa - 1$ degrees of freedom. In this case it is best to modify Q^2 by substituting $\kappa - 1$ for κ in the expression (19) so as to keep its mean value in sampling equal to unity, though this modification has not always been made.

This conception throws considerable light on two of the author's results. When there is no correlation between any of the series from the constituent parts of the data Von Bortkiewicz finds for n parts

$$Q_0^2 = \frac{1}{n} \sum_{\iota=1}^{n} Q_\iota^2 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (23)$$

Supposing each series to have κ degrees of freedom (which corresponds to κ terms if the true values of the mean be used in calculating the Q's, or $\kappa + 1$ if the mean be estimated from the data), this is equivalent to

$$\frac{\chi_0^2}{n\kappa} = \frac{1}{n} \sum_{\iota=1}^{n} \frac{\chi_1^2}{\kappa}$$

or

$$\chi_0^2 = \sum_{\iota=1}^{n} \chi_\iota^2 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (24)$$

so this result is simply equivalent to the fact that the χ^2 of several bodies of data possess the additive property.

If, however, there is perfect correlation between the constituent series the author finds

$$Q_0^2 = \sum_{\iota=1}^{n} Q_\iota^2 - n + 1 \quad . \quad . \quad . \quad . \quad . \quad . \quad (25)$$

This is equivalent to

$$\frac{\chi_0^2}{n\kappa} = \sum_{\iota=1}^{n} \frac{\chi_\iota^2}{\kappa} - n + 1 \quad . \quad . \quad . \quad . \quad . \quad . \quad (26)$$

If each series is really such that the probability of suicide is constant from term to term, this should be consistent with

$$\frac{E(\chi_0^2)}{n\kappa} = \sum_{\iota=1}^{n} \frac{E(\chi_1^2)}{\kappa} - n + 1 \quad . \quad . \quad . \quad . \quad (27)$$

but $\qquad E(\chi_0^2) = n\kappa \qquad E(\chi_r^2) = \kappa.$

so that the condition is satisfied.

III. *Orthogonal Polynomials and Multiple Regression Functions.*

Some interesting results of a very general nature concerning orthogonal polynomials have been obtained by Hildebrandt (A 33). Charlier's expansion of a frequency function in terms of the normal probability function and its successive derivatives is well known, and Romanovsky has shown that Pearson curves of Types IV, V and VI may be used as the generating functions of a series of semi-orthogonal functions in which a given frequency function may be expanded. Hildebrandt first establishes a theorem of a very general nature :—

If $\phi(x)$ is a function such that—

(1) $\phi(x)$ and all its derivatives are continuous for real values of x,
(2) $\phi(x)$ and its derivatives are zero at $x = \pm\infty$,
(3) $\lim_{x \to \pm\infty} x^n \phi^m(x) = 0$,
(4) $\{f_n(x)\}$ is a sequence of polynomials in x such that $\int_{-\infty}^{\infty} f_n(x)\phi(x) \neq 0$,

then there exists a unique sequence of polynomials $P_m(x)$, $P_m(x)$ at most of degree m, such that

$$\int_{-\infty}^{\infty} P_m(x)\,\frac{d^n}{dx^n} f_n(x)\phi(x)dx = 0 \text{ for } m \neq n\,; \;\; 1 \text{ for } m = n.$$

From this it follows that an expansion of any frequency function $F(x)$ may be obtained in the form

$$F(x) = C_0 f_0(x)\phi(x) + C_1 \frac{d}{dx}\{f_1(x)\phi(x)\} + C_2 \frac{d^2}{dx^2}\{f_2(x)\phi(x)\} + \ldots \quad (28)$$

where C_m can easily be determined by means of the orthogonal relations and depends upon the moments of $F(x)$ of order at most m.

The author then uses this result to show that "the form of the polynomials obtained by Charlier and Romanovsky for certain solutions of the Pearson differential equation can be found for any solution of this equation and that the relations existing between polynomials of the same system can also be generalized for the general solution and "for the most part obtained without having the explicit form of the solution." In a word, the novelty of the present work consists in the obtaining of the differential equations and recurrence relations of the polynomial direct from the constants of the differential equation of the Pearson curves without reference to the particular type of solution. The results, therefore, hold for all the curves of the Pearsonian system, as well as for the Hermite, Jacobi, Tchebycheff, Laguerre and Legendre polynomials.

Charlier has shown that a discrete function can under certain assumptions be expanded in the form

$$F(x) = B_0 g(x) + B_1 \Delta g(x) + \dots + B_n \Delta^n g(x) + \dots \quad . \quad . \quad (29)$$

where
$$B_n = \sum_{-\infty}^{\infty} Q_n(x) F(x)$$

the Q's being certain bi-orthogonal polynomials possessing the property

$$\left[\Sigma Q_n(x) \Delta^m g(x) \right]_{-\infty}^{\infty} \begin{array}{l} = 0 \text{ for } n \neq m \\ = 1 \text{ for } n = m. \end{array}$$

A particular case arises when $g(x) = \dfrac{e^{-\lambda}\lambda^x}{x!}$.

The author considers the case where $g(x)$ is given by

$$\Delta g(x) = \frac{a_0 + a_1 x}{b_0 + b_1 x + b_2 x^2} g(x) \quad . \quad . \quad . \quad . \quad (30)$$

and determines the difference and recurrence relations for the Q's in terms of the coefficients of this equation.

A process of fitting polynomials to observations at equal intervals by a modification of Tchebycheff's method is given by Sipos (A 78). The process depends, as does R. A. Fisher's, on successive summations of the observations, but different sums are used. Whereas Fisher uses successive sums from the beginning of the series, each column containing n terms where we have n observations, Sipos uses the successive sums from the end of the series, the number of items in the columns diminishing one each time. Thus Sipos' summations involve less work, but the subsequent work involved by his method, particularly his manner of getting the differences of the fitted series in order to build up the polynomial values of the fitted curve, seem considerably more difficult than Fisher's process. This may in part be due to the reviewer's unfamiliarity with the former. In estimating the standard deviation of the residuals the author makes no reduction for degrees of freedom. He has three interesting examples dealing with economic data.

It is well known that the point of Tchebycheff's process of fitting a polynomial in a series of orthogonal portions is that a term of higher degree can always be fitted without repeating the whole calculation. Romanovsky (A 71) has recently applied Tchebycheff's principle to getting a multiple regression equation in orthogonal form, so that an additional variate may always be added without repeating the calculation. If the variates $(x_1, x_2 \ldots x_n)$ be referred to their means and we take

$$u_1 = x_1, \quad u_2 = x_2 - \frac{(x_2u_1)}{(u_1u_1)}u_1$$

$$u_n = x_n - \frac{(x_nu_1)}{(u_1u_1)}u_1 - \frac{(x_nu_2)}{(u_2u_2)}u_n \ldots - \frac{(x_nu_{n-1})}{(u_{n-1}u_{n-1})}u_{n-1}$$

where

$$(x_gu_h) = \sum_{i=1}^{m} f_ix_{gi}u_{hi} \qquad (u_gu_h) = \sum_{i=1}^{m} f_iu_{gi}u_{hi}$$

the set of observations $y_i, x_{1i}, x_{2i} \ldots x_{ni}$ being observed f_i times, then the multiple regression equation may be written

$$y = A_1u_1 + A_2u_2 + \ldots + A_uu_n$$

where

$$A_h = \frac{(yu_h)}{(u_hu_h)} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (31)$$

This is the orthogonal form, while the sum of the squares of the residuals is given by

$$\begin{aligned}\delta_h{}^2 &= (yy) - \sum_{h=1}^{n} A_h(yu_h) \\ &= (yy) - \sum_{h=1}^{n} \frac{(yu_h)^2}{(u_hu_h)} \quad . \quad . \quad . \quad . \quad . \quad (32)\end{aligned}$$

From these fundamental formulæ everything required is easily deduced.

IV. *Contributions to Theory of Epidemiology, Population and Evolution.*

A mathematical study of great interest on the "Interaction between Hosts and Parasites" has been made by V. A. Bailey (A 3), who obtains expressions for—

(1) The density of unparasitized hosts in all stages at time t.
(2) The density of parasites, in all stages at time t.
(3) The density of parasites actually searching at time t.
(4) The density of hosts vulnerable and exposed to attack at time t.
(5) The age distribution functions (for both hosts and parasites) at time t.
(6) The birth-rates of animals (both hosts and parasites) at time t.
(7) The death-rates of animals (both hosts and parasites) due to environmental causes at time t.

(8) The rate of parasitization of hosts at time t in terms of—

(*a*) The forces of mortality at ages both for hosts and parasites.

(*b*) The probability, per unit of time, that a host of age ξ gives birth to a new host, i.e. *the fertility factor* (supposed known for all values of ξ).

(*c*) The probability that an animal of age ξ be in a condition to interact with an animal of the other species (supposed known for both hosts and parasite species and all ages), i.e. *the factor of interaction.*

(*d*) The effective areal rate of movement of a parasite, assumed to be constant.

The general equations are integral equations of a complex character and there seems little likelihood of their solubility; the method envisaged here does not, therefore, seem to be of much practical use to biologists *at present*; there appear, however, to be reasons for believing that the solutions may be such that the density of hosts and parasites would undergo increasingly wide oscillations about the equilibrium position.

Kermack and McKendrick give a "Mathematical Analysis of Dr. Napier's Statistics of Household Infection in *Kala-azar*" (A 42). If $v(n, x)$ denotes the number of households of n people of whom x are infected, and if $f(n, x)dt$ denotes the chance that a household comprising n members of whom x have been infected will receive a further infection during the time dt, then—

$$\frac{d}{dt}\{v(n, x)\} = f(n, x-1)v(n, x-1) - f(n, x)v(n, x) \quad . \quad . \quad (33)$$

The authors have found empirically that $f(n, 0)$ varies as $\sqrt{n}$, from which it follows—(1) that if the cases of disease in the households all existed simultaneously, we should have

$$f(n, x) = \frac{\kappa}{\sqrt{n}}(n - x) \quad . \quad . \quad . \quad . \quad . \quad (34)$$

from which it may be shown that

$$v(n, x) = N_n e^{-a\sqrt{n}} \frac{n(n-1) \ . \ . \ . \ (n - x + 1)}{x!} (e^{a\sqrt{n}} - 1)^x \quad . \quad (35)$$

N_n being the total number of households of n; (2) that if, on the other hand, only one infected person were present in the house at any particular period we should find

$$v(n, x) = N_n e^{-a\sqrt{n}} \frac{(a\sqrt{n})^x}{x!} \quad . \quad . \quad . \quad . \quad (36)$$

or the ordinary Poisson distribution.

The authors determine the constant "*a*" from numerical data, and find evidence that with each previous infection, the chance of the next infection is somewhat greater than that allowed for by formula (34). In any case there is clear evidence of intra-house infection.

The authors give an ingenious explanation of the empirical formula

$$f(n, 0) \propto \sqrt{n}.$$

If we have a tubular container with impermeable ends, filled with a gas A and contained in a gas B at the same pressure, the envelope of the container being permeable to gas B but impermeable to gas A, the chance of penetration by a molecule of gas A will be proportional to the surface, that is, to its length times the radius of the tube. The number of molecules contained is proportional to the length times the cross-sectional area. Thus it follows that the chance of penetration by a molecule of gas A will be proportional to the square root of the number of molecules inside the container.

"The parallel picture is that of a number of one-story houses of equal height, but otherwise similar in shape, and of such an area that each inhabitant is allowed a definite amount of floorage, as is the custom in hospitals and like institutions. The walls are perforated by windows and doors, the number of these being proportional to the perimeter. If infection comes from without through the windows and doors, and in a random manner, then the chance that an infection will occur will be proportional to the perimeter, which in the conditions assumed is proportional to the square root of the number of inhabitants." While the authors do not stress the square root formula unduly, it is clear that "the number of cases in which several infections occur in the same house appears to be too great to be explained without the assumption of intra-house infection; an assumption which is consistent with the view of transmission by the sand-fly as well as with that of transmission by direct contagion occurring within the household."

Turning to studies of the theory of population growth we find that Merrell has considered "The Relationship of Individual Growth to Average Growth." If a polynomial be fitted to the average measurements of a series of individuals over a period of time, this polynomial is identical with the polynomial obtained by averaging the constants of the individual polynomials. But this is not true for functions in general, and in particular is not true for the logistic curve. The authoress has compared for data on the growth of 46 rabbits—

(1) The true mean logistic.
(2) The mean-constant logistic.
(3) Reed and Pearl's "mean logistic."
(4) The logistic fitted to the means.

The differences between these various curves depend on the coefficient of variation of the constants, being unimportant when these are small. In the material considered these are about 18 per cent., and the difference between the four curves is shown to be unimportant at this level of variation. The process of averaging does, however, introduce an element of skewness, not present in the individual growth curves.

Of more importance are two papers by Lotka (A 45 and 46) on "The Structure of a Growing Population" and on "Orphanhood in Relation to Demographic Factors." In the former the author determines a formula for the number of births per annum in a population growing according to the logistic law and with a fixed life table. If the equation to the logistic is

$$y = \frac{N_\infty}{1 + e^{-rt}}$$

and $p(a)$ is the probability of a person born surviving to age (a), then $B(t)$, the number of births per annum at time t, can be expanded in a series in powers of r, the coefficients of which involve the semi-invariants of the survival curve and powers of the hyperbolic tangents of $\frac{rt}{2}$. The form of the solution becomes simpler when expressed not in terms of t, the time measured from the centre of the logistic, but in terms of t' where $t' = t + \lambda_1$ and λ_1 is the ratio of the mean age of the living to the expectation of life at birth (L_0). We then have

$$B(t) = \frac{N_\infty}{L_0}\left\{\left(\tfrac{1}{2} + \tfrac{1}{2}\tan h\frac{rt'}{2}\right) + \frac{\lambda_2 r^2}{4 \cdot 2\,!}\left(\tan h\frac{rt'}{2} - \tan h^3\frac{rt'}{2}\right)\right\} \qquad (37)$$

$+$ terms in higher powers of r where λ_2, λ_3, λ_4, are the successive semivariants of the survival curve, *i.e.*

$$_2 = \int_0^\infty a^2 p(a)da - \left\{\int_0^\infty ap(a)da\right\}^2$$

The first term of this expression is remarkably close to the true result, and the second term is of appreciable importance, but the third, fourth and fifth terms, which involve in addition λ_3, λ_4 and λ_5 and higher powers of $\tan h\frac{rt'}{2}$, are very small indeed.

The author then deduces the curves of birth-rate, age distribution, fertility, true inherent rate of natural increase, size of families and number of children per mother. He illustrates by a logistic curve fitted to the U.S. population. In the last section of the paper he deals with the influence of changing mortality by an ingenious approximation obtained by computing a number of birth curves based on different life tables and combining the results into one curve. The effect of changing mortality on the death-rate is interesting, as illustrated by the logistic fitted to the U.S. population. For *a fixed life table* the death-rate curve take the form of a very flat **S**, starting from a lower asymptote of 10·5 per 1,000 per annum (as computed on the basis of the 1919–20 life table) and turning upwards to seek finally the level of the upper asymptote at 17·4, where it joins the birth-rate that approaches the same asymptote from above. The curve computed on the basis of *a fluent life table* is quite different in character. After running nearly level for a considerable period, it presently turns downward, following the general course of the birth-rate until about the year 1930 or 1940, after which it turns up again and approaches the common asymptote on which birth-rate and death-rate unite at the level corresponding to a stationary population for the life table that has been selected as the ultimate life table.

In the second paper, an extremely interesting one, dealing with orphans, the author shows that the frequency of orphans at a given age can be deduced from the laws of fertility and mortality. Where direct data on orphanhood is lacking, as is apparently the case in the U.S., this is the only method of approach. The author applies his methods both to the population of the U.S. and to England and Wales. In the latter case he can compare his deduced values with those actually observed; the differences in 1921 he considers on the whole not greater than would be expected taking the war disturbance into consideration.

If $B_f(t)$ are the number of births per unit of time at time t, $p_f(a)$ the proportion of women who survive to age a and $m_f(n)$, the average maternity frequency of women at age n, *i.e.* the number of daughters born, per woman of age n, per unit of time—the latter two functions being supposed independent of the time over the period considered—then the proportion of female maternal orphans among females of age a to $a + dn$ is shown to be

$$1 - \int_0^\infty \frac{B_f(t_0 - a - n)}{B_f(t_0 - a)} p_f(a + n) m_f(n) dn \quad . \quad . \quad (38)$$

and the total number of female orphans between the ages of a_1 and a_2 is

$$\int_{a_1}^{a_2} B_f(t_0 - a) p_f(a) da \left\{ 1 - \int_0^\infty \frac{B_f(t_0 - a - n)}{B_f(t_0 - a)} p_f(a + n) m_f(n) dn \right\} \quad (39)$$

The author then proceeds to evaluate these expressions on the assumption that the population is Malthusian, *i.e* that there is a constant increase in the birth-rate per unit of time. If we suppose that the maternity frequency and mortality be fixed, this constant increase is the real root (r_0) of the equation

$$\int_0^\infty e^{-ra}p(a)m(a)da = 0 \quad . \quad . \quad . \quad . \quad . \quad (40)$$

On this assumption the author shows that a good approximation to the expression (38) is given by

$$1 - \frac{p_f(a + \bar{n})}{p_f(\bar{n})}$$

where $\bar{n}$ is the average age of the mother when the daughter is born.

In general the expression (38) can be evaluated as a rapidly convergent series of powers of r_0, whose coefficients involve the differential coefficients of $\phi(n) = \frac{p_f(a + n)}{p_f(n)}$ and the semi-invariants of $p_f(n)m_f(n)$.

Approximations to these functions are, of course, obtained from the observed data. The cases of posthumous orphans, male maternal orphans and female maternal orphans are all considered; so is the annual accession of new orphans.

The author stresses the value of "Population Analysis," of which this study is an example. "We are concerned in vital statistics with *numbers of persons*, their *age* and *sex-ratio*, *birth-rate*, *death-rate*, *marital state*, *fertility* as functions of age and sex, *marriage rates*, *remarriage rates*, *widowhood*, *orphanhood*, *divorces*, etc., to mention only a few of the most significant examples. Now these several variables are not *independent*. There exists between them a system of relations complicated not only by the large number of variables involved, but even more by the fact that these relations are not of the simple form of mathematical functions whereby the value of one variable is fully determined when all the others are known; the relations between the multitude of variables are of the nature of correlation such that only the frequency distribution of the value of a variable is defined, when the values of the remaining variables are known. . . . Aside from such obvious practical utility of indirect methods as means for securing information otherwise inaccessible, the study of *Population Analysis* as a system of inter-relations between the characteristics of a population, has an important function as an aid to thinking. The variety of such characteristics with which we commonly have to deal presents itself to the mind as a bewildering chaos designed to burden the memory and to confuse our wits, unless we see these characteristics as hanging together by the ties of causal relation. From this standpoint alone the cultivation of *Population Analysis*, that is, a rational, as distinguished from a merely empirical study of vital statistics, is eminently desirable."

Professor Sewall Wright contributes a paper on the "Statistical Theory of Evolution" to the *Journal of the American Statistical Association* (A 74). He shows that the effect of random sampling in a breeding population of limited size will keep the frequency of any gene from settling in equilibrium. The resultant of these tendencies is a certain frequency distribution, or probability curve, for a gene frequency in place of a single equilibrium value. The general equation to the frequency distribution is—

$$y = Ce^{4Nsq}\, q^{4N(mq_m + v) - 1}(1 - q)^{4N\{m(1 - q_m) + u\} - 1} \quad . \quad . \quad (41)$$

where N represents the effective size of the population, u is the mutation rate to and v from the gene in question, m the amount of exchange with other populations in question, s the selection coefficient (such that the gene and its array of allelomorphs reproduce at the rate $1 : 1 - s$ respectively). Gene frequency is represented by q, and q_m is a constant which depends on the frequency of the species as a whole. The form of the curve may vary very greatly, depending on the relative magnitude of the coefficients, and by making various assumptions as to these magnitudes, evolutionary effects may be studied. The analysis leads to the conclusion that "the conditions favourable to progressive evolution as a process of cumulative exchange are neither extreme mutation, extreme selection, extreme hybridization nor any other extreme, but rather a certain balance between conditions which make for genetic homogeneity and heterogeneity. Such a situation means on the one hand the retention of a great store of variability in the population, and on the other hand a random drifting of the mean grade of all characters, leading occasionally by chance to the attainment of exceptionally favourable gene combinations. In particular, a state of subdivision of a sexually reproducing population into small, incompletely isolated groups provides the most favourable condition, not merely for branching of the species, but also for its evolution or a single group."

In another paper in the same journal (A 73), on "Statistical Methods in Biology," Professor Sewall Wright describes a method by which he builds up a scheme of causation of the phenomenon studied, and associates a correlation coefficient with every link in the chain, so that this coefficient has, as it were, a direction (from A to B or from B to A) as well as a magnitude. The magnitude of the inter-correlations of the system may be estimated from the data together with the underlying biological hypotheses, though we are not necessarily always led to unique or to possible solutions. This is quite a different process from the purely empirical process of forming equations of estimate.

V. *The Mathematical Statistics of Psychology.*

A paper by H. B. Heywood on "Finite Sequences of Real Numbers" discusses some theoretical mathematical properties which are needed in Spearman's "Single General Factor" theory of intelligence. A sequence as defined by Heywood is a set of a definite number (N) of values of a variate in a definite order. From a geometrical point of view the sequence could be regarded as vector in N dimensions, though Heywood does not do this. Two sequences are said to be orthogonal if there is a zero correlation between their elements, or, geometrically speaking, if the corresponding vectors are at right angles. All the sequences dealt with are standardized, that is to say, referred to their mean as origin and with their standard deviation as a unit. Heywood shows that mutually orthogonal sequences are independent (in the sense that no linear relation exists between them), that it is possible for $N - 1$ sequences but no more to be mutually orthogonal, that any sequence can be expressed uniquely as a linear function of any $N - 1$ mutually orthogonal sequences, and that a set of n independent sequences can be expressed as linear functions of n mutually orthogonal sequences in an infinite number of ways. He then goes on to show that any sequence $\mathbf{y}$ can be expressed uniquely in the form

$$\mathbf{y} = \alpha_1\mathbf{x}_1 + \alpha_2\mathbf{x}_2 + \ldots + \alpha_n\mathbf{x}_n + \alpha'\mathbf{\Phi} \quad . \quad . \quad (42)$$

where $\mathbf{x}_1, \mathbf{x}_2, \ldots \mathbf{x}_n$ are given independent sequences and $\mathbf{\Phi}$ is orthogonal to them. This is a most important proposition from the point of view of the single factor theory.

He next shows how to find a sequence $\mathbf{y}$ having given correlation coefficients $r_1, r_2 \ldots r_n$ with a given set of independent sequences $\mathbf{x}_1, \mathbf{x}_2, \ldots \mathbf{x}_n$; then considers the necessary and sufficient condition for the existence of sequences $\mathbf{x}_1, \mathbf{x}_2, \ldots \mathbf{x}_n$, having given correlation coefficients between each pair, and shows how to find such a sequence if it exists.

It must be noted that this theory has other applications in statistical method besides that to the "Single Factor" problem. It sheds, perhaps, new light on multiple regression equations; it is related to the analysis of variance, since there we are concerned with the expression of quadratic functions as a sum of a number of squares of orthogonal expressions, and it has an obvious relation to Frisch's theory of cluster types (C 9). These results are here used by Heywood to prove the fundamental theorem of the Single Factor Theory in the following form :—If we have a set of sequences expressible in the form

$$\mathbf{x}_1 = r_1\Phi + r_1'\Phi_1,\ \mathbf{x}_2 = r_2\Phi + r_2'\Phi_2\ .\ .\ .\ \mathbf{x}_n = r_n\Phi + r_n'\Phi_n\ . \qquad (43)$$

where Φ, Φ_1, Φ_2 . . . Φ_n are an orthogonal set of $n + 1$ sequences and therefore

$$r_1^2 + r_1'^2 = r_2^2 + r_2'^2 = r_n^2 + r_n'^2 = 1$$
$$(r_1 \leq 1,\ r_p < 1,\ p = 2, 3\ .\ .\ .\ n),$$

then if r_{pq} be the correlation between x_p and x_q we shall have

$$\frac{r_{pq}}{r_{sq}} = \frac{r_{pt}}{r_{st}},\ p \neq q \neq s \neq t \quad .\ .\ .\ .\ \qquad (44)$$

Conversely, if we have a set of independent sequences $\mathbf{x}_1$, $\mathbf{x}_2$ . . . $\mathbf{x}_n$ satisfying the relations (44) with $r_1 \leq 1$, r_1 being the greatest of the r_p's where $r_p^2 = \frac{r_{pt}r_{ps}}{r_{st}}$ (for all values of s and t satisfying $p \neq t \neq s$), then $\mathbf{x}_1$, $\mathbf{x}_2$ . . . $\mathbf{x}_n$ can be expressed in the form (43) with

$$\Phi = \alpha_1\mathbf{x}_1 + \alpha_2\mathbf{x}_2\ .\ .\ .\ + \alpha_n\mathbf{x}_n + \alpha'\Phi'$$

where the α's and α' are easily determined, and Φ' is an *arbitrary sequence.*

It is easily shown that

$$\alpha_p = \frac{r_p}{1 - r_p^2},\ \alpha'^2 = \frac{1}{1 + S\left\{\frac{r_p^2}{1 - r_p^2}\right\}} \quad .\ .\ \qquad (45)$$

The same problem has been discussed by E. B. Wilson (C 18) in a somewhat similar manner, but using geometrical language. Corresponding to a sequence, Wilson uses a unit vector, so that if, for example, we have tested N students in k tests the results may be represented by k unit-vectors whose end points will lie on a unit sphere, the dimensions of whose surface are $N - 1$. Wilson then showed that if the tetrad-conditions (44) are satisfied, the resulting figure on the sphere is such that every side is at right angles to every other side not having a common vertex with it, and that, further, this hyper-spherical figure (which is a generalized tetrahedron) will have an orthocentre. Conversely, if the figure has an orthocentre the tetrad-conditions are satisfied. The general factor then consists of two components, the one determinate in magnitude and lying along the orthocentral axis (joining the orthocentre to the origin) and the other determinate in magnitude but indeterminate in direction, lying in the space of $N - k - 1$ dimensions at right angles to the k-space of the k unit vectors.

It may be shown that Wilson's resolution into determinate and indeterminate portions is identical with Heywood's result. The result is also identical with that given by Piaggio (C 14), who obtained an estimate of the general factor by taking that linear function of the individual test scores with which it correlated most highly. It is interesting to see how three different view-points all lead to the same result. It may be regarded as established that the vanishing of the tetrad-conditions does not lead to a unique value of the general factor. It will always leave an arbitrary component which can, as a rule, be made as small as we please by taking enough tests. But it should be noted that supposing we had four tests, all the inter-correlations being 0·5, the standard deviation of the arbitrary component would be 0·45 units as compared with 0·89 for the determinate component.

VI. *Other Investigations.*

An important generalization of Student's Ratio has been discovered by Hotelling (A 36). Let us suppose we have p variates and are given N values of each of them. Let $X_{\iota\alpha}$ be a particular value of the ith variate. We are very often in the position of making the hypothesis that

$$X_{\iota\alpha} = \eta_{\iota\alpha} + \varepsilon_{\iota\alpha} \quad . \quad . \quad . \quad . \quad . \quad . \qquad (46)$$

where $\varepsilon_{\iota\alpha}$ is normally and independently distributed with variance σ_ι^2, and that the other component depends in some regular manner on the time, place or other circumstances of the αth observation. We usually suppose that

$$\eta_{\iota\alpha} = \sum_{s=1}^{q} g_{\alpha s}\zeta_{\iota s} \quad . \quad . \quad . \quad . \quad . \quad . \qquad (47)$$

where the g's are known and the ζ's are coefficients to be determined. Thus, if we were fitting a secular trend by a polynomial in time, the g's would be the successive powers of the time-variable. Or all the g's except one might be zero, the remaining one unity and ζ_ι the mean value of $X_{\iota\alpha}$. We usually estimate the ζ's by least squares; suppose we do so and that we work out the estimates of the variances and co-variances of the residuals given by

$$a_{ij} = \frac{1}{n} \sum_{\alpha=1}^{N} x_{\iota\alpha} x_{j\alpha} \quad . \quad . \quad . \quad . \quad . \quad . \qquad (48)$$

where $n = N - q =$ number of degrees of freedom

and $$x_{\iota\alpha} = X_{i\alpha} - \bar{x}_{i\alpha}$$

$\bar{x}_{\iota\alpha}$ being our estimate of $\eta_{\iota\alpha}$. If now ξ_ι is a linear function of the observed values of the ith variate such that the sum of the squares of the coefficients is unity, so that the variance is the same as for a single observation, and such that the expectation of ξ_i on the hypothesis tested is zero, Hotelling determines the frequency distribution of

$$T^2 = \sum_{i=1}^{p} \sum_{j=1}^{p} A_{ij}\xi_i\xi_j \quad . \quad . \quad . \quad . \quad . \quad (49)$$

where A_{ij} is the co-factor of a_{ij} in the pth order determinant $|a_{uv}|$. He finds for the distribution of T

$$\frac{2\Gamma\left(\frac{n+1}{2}\right)}{\Gamma\left(\frac{p}{2}\right)\Gamma\left(\frac{n-p+1}{2}\right)n^{p/2}} \quad \frac{T^{p-1}dT}{\left(1+\frac{T^2}{n}\right)^{\frac{n+1}{2}}} \quad . \quad . \quad (50)$$

which reduces to Student's distribution when $p = 1$. The result is of very great importance, as many statistical tests can be reduced to the T form. The coefficient of racial likeness, if correctly calculated, is a case in point; another would be the comparison of the prices of a list of commodities at two different times. A further application would be to test simultaneously whether a series of pairs of regression coefficients differed significantly. For example, supposing we had calculated in two places the average change per inch of rain of the yield of wheat, oats and barley and wished to know whether the effect of rain on crops as a whole differed from the one place to the other.

Some other solutions to distribution problems are also worthy of note. Rietz (A 70) gives the exact frequency distribution of the standard deviation of samples of three drawn at random from a population with a rectangular distribution. The solution is found to be

$$f(s) = \frac{6\sqrt{3}}{a^3}[\pi a - 3s\sqrt{6}]s \quad \text{when} \quad 0 \leq s \leq \tfrac{1}{6}a\sqrt{6}$$

$$f(s) = \frac{18}{a^3}\Big\{- a\sqrt{3}\,\text{arc cos}\left(\frac{a^2}{3s^2} - 1\right) + 2\sqrt{18s^2 - 3a^2} + \tfrac{1}{3}\pi a\sqrt{3} - 3s\sqrt{2}\Big\}s$$
$$\text{when} \quad \tfrac{1}{6}a\sqrt{6} \leq s \leq \tfrac{1}{3}a\sqrt{2} \quad . \quad . \quad (51)$$

where s is the standard deviation and a the range of the population. Up to $s = \frac{1}{6}a\sqrt{6}$ the frequency curve is therefore a parabola; it then changes into a transcendental curve with continuity of slope at the point of junction. When $a = 4$, 98·86 per cent. of the area under the curve is under the parabola to the left of the ordinate $s = \frac{1}{6}a\sqrt{6}$.

Hojo (A 34) obtains expressions for the first four moments, β_1 and β_2 of the distribution of the median, quartiles and the inter-quartile distances. The expressions are rather complicated integrals which he evaluates by quadrature, numerical values being given for the following sizes of sample :—

	μ_2.	μ_3 and β_1.	μ_4 and β_2.
Median	1—(1)—12	(Always 0 for median)	1—(1)—8
Quartiles	1—(1)—13	1—(1)—10	1—(1)—10
Inter-quartile distance ...	1—(1)—12	1—(1)—6	1—(1)—6

The nature of the approach of the standard deviations, β_1 and β_2 of the distributions to their limiting forms, when the size of sample becomes indefinitely large, is discussed.

Professor Karl Pearson (A 62) determines the mean values and second moments of any rank, the product moment of any two ranks, and hence the variance of any rank and of the distance between any two ranks by a method which consists essentially in expanding the rank deviate in terms of the frequency up to that value. For *a normal population*, convergency difficulties make this method of doubtful validity for ranks above the eightieth or below the twentieth percentiles. The values he obtains for the median and quartiles are less accurate than those of Hojo's for smaller samples than about 15, agree very well with them for samples of about this size, and fill in the gap between samples of 15 and samples of about 100, for which an asymptotic formula becomes applicable. For *rectangular populations* the deviate is a constant multiple of the frequency which enables exact results to be obtained, and the distribution of the qth rank and of the interval between the qth and q'th ranks are given *exactly* by curves of Pearsonian type. These are in general of Type I, but may degenerate into Type IX in special cases.

In 1931 we again find a number of papers dealing with experimental sampling investigations, directed to obtaining the approximate form of the sampling distribution of statistical estimates when their exact form is unknown. Thus E. S. Pearson (A 56) examines the simplest form of the analysis of variance for cases of non-normal variation. The results of his investigation suggest that moderate a-normality (say $\beta_1 < 1{\cdot}0$, $1{\cdot}8 < \beta_2 < 5{\cdot}0$) is of little influence on the method ordinarily applied. Experimental sampling investigations have also recently been carried out by Baker (A 7), Dunlap (A 19), Le Roux (A 44) and Rider (A 67).

The following classical problems in inverse probability have recently been considered by Romanovsky (A 72). [See also Molina (A 50).]

I. Given s independent trials relative to an event E, and that in any trial the probability of the occurrence of E has the constant and unknown value p_0. Supposing that in s trials E occurs k times ($k < s$), what conclusion can be drawn about the unknown probability p_0?

II. On the hypothesis of the preceding problem s, new trials are made. What probabilities can be assigned to the different possible values of the number (k) of times that E can occur in these new trials, if one knows the results of the s trials previously made?

The classical solution to both these problems is given by Bayes' Theorem, and the resulting asymptotic expressions when s tends to infinity are well known. Romanovsky gives a clear and elegant demonstration of a property proved by Von Mises, that these asymptotic expressions remain true when, instead of the values of the "a priori" probability being all equally likely, their frequencies are given by any function which is *continuous* in the interval o — 1. It is, of course, widely known that the results of "inverse probability inference" are to this extent independent of the nature of the distribution of "a priori" probabilities. Edgeworth (C 1), for instance (following Laplace and Poincaré), showed that if the distribution of "a priori" probabilities has a finite first differential coefficient throughout its range, inverse probability inference will for large samples be independent of its form. The above result is a little more general, since it only demands continuity and not the existence of a differential coefficient. Of course this condition will not always be satisfied. If we consider, for instance, intra-class correlation coefficients, the "a priori" distribution of intra-class correlation coefficients might well have a maximum near zero; but if there are k members in each class the coefficient cannot be less than $\frac{-1}{k-1}$. Now there is no limit that we can set to the size of k; if we consider eggs from the same fish, for instance, k might run into many millions. Thus we can see that we might get cases where negative values, however small, were impossible, while small positive values would be very frequent. The distribution of "a priori" values would clearly be discontinuous at zero. (This example was given to the writer by Dr. R. A. Fisher a year or two ago.)

One consequence of the above theorem in inverse probability is that the classical method of estimating the parameters of a distribution by making the "a priori" probability a maximum will as a rule differ little from the method of maximum likelihood. But the latter, independent as it is of all assumptions about "a priori" probability, is to be preferred.

In conclusion, it must be emphasized that it has only been possible to discuss a selection of the available literature, but as many references as possible have been put into the bibliography.

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THE INDEPENDENT WORKER AND THE SMALL FAMILY BUSINESS.

A STUDY OF THEIR IMPORTANCE ON MERSEYSIDE.

By H. J. H. PARKER, B.A.

Mr. Caradog Jones, in forwarding this paper, stated that it was based entirely on material collected and analysed in the course of the Merseyside Social Survey, some account of which has appeared in earlier papers contributed to the *Journal.*

INTRODUCTION.

THE immense growth and prosperity of the multiple store has been one of the outstanding features of recent years. How is this development affecting the small shop? Is its extinction merely a matter of time? This is a question of no little social and economic importance. For whilst it would be generally agreed that this type of business is still of some importance in the life of the countryside and of the small town, knowledge of its condition in a large industrial area would seem to be very incomplete.

In the following study three main groups are discussed. Firstly, there is the group which throughout this article is termed "the Independent Workers." They are distinguished by the fact that their livelihood is principally earned when working with their own tools usually in their own home, on their customers' property or in their workshop. Some of them may possess a "shop" or office in which to receive orders, but the selling of goods over the counter is not their main occupation. Secondly, there are the small shopkeepers with whom were included those coal-dealers who possessed offices of their own. The small shopkeepers were found to be almost as numerous as the Independent Workers. A third group embraces all street sellers, including hawkers and newsvendors. This group was about a third of either of the other groups in number. The term *self-employer* will be used when referring to all three groups without distinction.

Advantage has been taken of the material collected by the Social Survey of Merseyside to examine the economic position of the self-employer in that area and of all families sampled which derived at least a part of their total income from such a source. Used for this purpose the material had certain drawbacks. In making the sample house-to-house enquiry * the investigators were instructed to exclude all hotels, public-houses and lodging-houses, and only to include a shopkeeper if he employed no labour (outside his family) and if his net proceeds were probably less than £5 a week. These instructions have undoubtedly excluded the small border-line firms with one or two assistants which approximate very closely to the small family business discussed in this article. All professional men, including chemists, were omitted in addition to a few very successful businesses run by members of large families with profits in excess of £5 a week. As a result it is probable that the figures recorded are on the conservative side, although over 600 businesses in all were discovered in the sample.

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* The sample was obtained by visiting one in thirty of all houses inhabited by what might be broadly described as working-class families.

It was found that nearly 6 per cent. of the occupied population in the sample enquiry were in full-time employment as Independent Workers or in some form of small family business. This percentage was raised to 7½ per cent. if only the adult occupied population (Age, 22 +) were considered. The percentage of occupied females so employed was slightly higher than that of occupied males. If only *adult* occupied females were considered the percentage was raised to over 13 per cent. (a figure which is explained by the small amount of work available on Merseyside for adult women). These figures exclude all cases in which part-time assistance was rendered in their free time by members of the family who followed other occupations as their main source of income. This assistance is of very real value in certain types of shop, such as a fish-and-chip shop or a supper-bar, and plays a large part in most small shops. It was found that both small shopkeepers and—to a lesser extent—Independent Workers were more numerous and more successful in the outer and residential districts of the area than elsewhere. Hawkers, on the other hand, came very largely from the districts near the docks. In Wallasey, self-employers formed nearly 10 per cent. of the adult occupied population (compared with 7½ per cent. for the whole of Merseyside), although the numerous seaside apartment houses were excluded from the enquiry. The greater success of the self-employer—in particular the small shopkeeper—in the outer areas is a little difficult to account for. Differing social conditions there probably play their part. The giving of credit, which is a great source of weakness to the small dealer in the slums, is not so widely practised in the better-off outer districts. Difficulty of communication with the centre of Liverpool is probably the small man's chief advantage in these districts. This is particularly important in the Wirral, where the opening of the new Mersey Tunnel will almost certainly benefit the big Liverpool store at the expense of the small shop.

The classes included in this study do not differ very widely from those defined in the 1921 Census as "Workers on their own Account." The Census figures take in such a group as lodging-house proprietors who are excluded from the Survey sample; but this is more than offset by the fact that all engaged in family businesses which provide employment for more than one member of a family are excluded from the Census total on the ground that they are not workers on their own account: a father employing his son counts as an employer and his son counts as an employee. With this qualification it is possible from the Census records to make a rough comparison between the figures for self-employers on Merseyside and elsewhere. In the four Merseyside county boroughs in 1921 "workers on their own account" amounted to 4·7 per cent. of the occupied population compared with 6·3 per cent. for the whole of England and Wales. Since, however, the rural areas have a considerable influence upon the proportion for the whole country—"workers on their own account" forming nearly 12 per cent. of the males engaged in agriculture—it is probably better to compare the position on Merseyside with that in the six largest industrial areas of England combined together. In these areas "workers on their own account" formed 5·2 per cent. of the occupied population. In point of relative numbers such workers thus appear to be slightly less important on Merseyside than in industrial districts generally, and certainly less important than in Greater London, where they formed 5·6 per cent. of the occupied population. It should be remembered, however, that in the Census figure quoted for Merseyside, those parts of the area which are outside the four county boroughs are not included.

INDEPENDENT WORKERS.

The vast majority of the Independent Workers on Merseyside were men. By far the largest group amongst them were those occupied in various jobs concerned with house repairs and alterations, such as jobbing contractors, french polishers, plumbers, joiners, shop-fitters, electricians, etc. They formed 19 per cent. of the family businesses in this category and were particularly numerous in the suburban areas. Window-cleaners and shoe-repairers were the next most important groups amongst men. Both occupations still appear to offer the small man an opening. The next three largest groups were the agents, dealers, etc., a somewhat miscellaneous group; the carriers, carters, and motor-men and the furniture-makers and various wood-workers. These last two groups have in the past been of importance on Merseyside. The large amount of carrying in connection with a big port gave the carter a good return, and cabinet-making was one of the chief skilled trades of the district which could be carried on as a family business. The small carrier to-day appears to be most successful in the outer districts of the area. There were in the sample a number of cases of carters living in the dock area whose receipts in the week of enquiry were practically nil. It seems probable that whilst carting still repays the large firm carrying goods regularly from the docks to the warehouses, etc. in the centre of the area, the small man carrying casual loads for varying distances is much better off with a motor-lorry. The independent carter is certainly tending to disappear, whilst the motor carrier is not. Other groups amongst the men were gardeners, chimney-sweeps, and a mixed group of specialized workers. The gardeners—as was to be expected—were most numerous in the outer districts and the specialized workers in the middle of Liverpool.

About 23 per cent. of the master Independent Workers were women and about 21 per cent. of the total employed in the category of Independent Workers. Dressmakers of various types were the second largest group amongst the Independent Workers as a whole, although dressmaking would not appear to be so important as in the recent past. Nearly half of the women amongst the Independent Workers were dressmakers however. Their chief other occupations were nursing, laundering, and music-teaching, of which nursing was the most remunerative.

Just over 11 per cent. of the Independent Workers received full-time assistance from some other member of the household. About 14 per cent. of the Independent Workers were found to possess workshops, etc. away from their homes, but the great majority carried on their trade at home or from their home address.

Most of the Independent Workers are of two types. There are a few in highly skilled trades such as printing, cabinet-making, and in such work as the making of stained glass, leather goods or portmanteaus. There are others of a somewhat similar type who work at occupations where the consumer requires a great deal of attention, such as midwives, dressmakers, and music-teachers. The majority of the Independent Workers, however, are of a different character. They are occupied primarily in repairing or cleaning. In work such as house-repairing, window-cleaning, and shoe-repairing, the small man is most able to meet the competition of the big firm owing to the smallness of the size of the usual job to be done, the individual attention required by the consumer and the fact that it is difficult to apply mass methods to much repair work. Two of the groups amongst the Independent Workers feel a good deal of competition from the large firm, namely, the dressmakers and launderers, but neither of them show any signs of being stamped out.

THE SMALL SHOPKEEPER.

The grocery and general stores formed nearly 24 per cent. of the small family shops. Under this heading, however, were included shops of a very different standard of prosperity. The other food shops were 22 per cent. of the small shops. The greengrocers and fruiterers were the most numerous in this group, followed closely by the dairymen and cow-keepers and the bakers and confectioners. The butchers and fishmongers were some way behind. The tobacconists and newsagents were next in number after the food shops, followed by the restaurants (chiefly fish-and-chip shops), the clothing shops and the hairdressers. There was no other group of any size save the coal-dealers, who, although not strictly shopkeepers, have been included in this category as being more like the shopkeeper than the Independent Worker. About 45 per cent. of the shopkeepers and over half of the total members of the family employed in the small shops were women. The immense majority of the general shops were kept by women, the feeding and clothing shops were kept evenly by the sexes, but the men preponderated in all the other groups.

About 20 per cent. of the small shops gave full-time employment to more than one member of the family although only 2 per cent. gave full-time employment to more than two members of the family; 20 per cent. of the small shops were carried on at a different address from the living address of their owners. The chief advantage of the family shop over the big store is that it is close at hand and can supply the needs of the customer when he wants the goods which are usually required only in small quantities. In the better-off outer districts quality has a big influence with the large minority of housewives, who like the food they buy to be a little out of the ordinary kind supplied by the big store. Personal attention to the needs of the consumer is everywhere a telling factor in favour of the efficient small shopkeeper. These advantages, however, are frequently offset by the smallness of the stock, which greatly limits the customer's choice and drives him to the big store. The long hours of labour—often with very little custom—must be a .great burden on the one-man shopkeeper, although his position is considerably eased when the work can be shared with other members of the family.

The small general shop has been hit particularly hard by the multiple store and the Co-operative Society. In Liverpool the majority of them are not the chief source of income to the family rrying them on, but are definite "subsidiaries" to the family come. Prosperous independent grocers and butchers are limited largely to the outer suburbs. In other districts they have given ground to the same competition as the small general shop. The greengrocer, the dairyman and the baker-confectioner have all stood up better to this competition. Despite the big shop's continual attempt to increase its "services to the public" it is difficult to organize a wholesale distribution of milk or bread which will work without friction. The small man has thus an opportunity to please customers by personal attention to their varying requirements. The perishable nature of much of their stock has been an important factor in the survival of the small fishmonger and greengrocer; both the multiple store and the co-operative store appear to have been held in check by the fear of large losses if they embarked on large-scale trading in these directions. The increased consumption of fruit and vegetables in recent years has benefited the small greengrocer. An interesting difference of social habit is revealed by the fact that the greengrocers' shops are far more numerous in the outer districts where the standard of living is higher than in the inner districts. The baker and the dairyman are more evenly distributed.

Tobacconists, newsagents and hairdressers have been the least threatened by the intrusion of the big store. Tobacco and sweet manufacturers and newspaper proprietors find it simpler to sell their goods through the numerous small shopkeepers rather than embark upon the immense expense of opening their own shops everywhere. The majority of small shops obtain their goods through the medium of wholesalers, but a great many wholesalers will not supply small shops when their orders are very small. This applies in particular to the small general shops which have to obtain their stock from larger shops at slightly above wholesale prices. The greengrocers and fishmongers usually obtain their supplies daily in the market. In many cases the greengrocers buy direct from Lancashire small farmers, who bring their produce into Liverpool to dispose of personally at the wholesale fruit and vegetable market. "Price-cutting" appears to be particularly prevalent in this district. So far as can be judged, this practice is a very serious inconvenience both to the manufacturer and to the ordinary small shopkeeper. It is stated on fairly good authority that one large firm of cigarette manufacturers has instituted a policy of dealing directly with small shopkeepers whenever possible in an attempt to stamp out "cutting." Whether this attempt will be successful it is difficult to say. If "cutting" continues on a large scale it will certainly lead to changes in the organization of those forms of

business where it is carried on and may threaten the supremac
of the small shopkeeper there.

The small coal-dealer serves the working-class districts where orders are small and where a big firm has no advantage in the distribution of coal. Clothing shops, although still numerous, have suffered from the competition of the big store. The most prosperous were the small number of bespoke tailors. Drapers were comparatively successful in the suburbs, but their profits were low in most parts of Liverpool. The takings of old-clothes dealers were below the average of profit made by small shops as a whole. The house furnishers have dwindled to a handful. The instalment system and the large stocks of the bigger shop probably affected them adversely. The sample taken included a number of herbalists who appear to be numerous in the district; but "luxury" shops such as photographers or music shops were seldom seen, except for a few in the centre of the city.

HAWKERS.

Newsvendors were the most numerous group in the third body of self-employers, followed closely by those describing themselves as general hawkers. Fruit and fuel hawkers were the next largest groups. In a port such as Liverpool there is always a large amount of fruit imported that has to be sold off as quickly as possible. The selling of firewood which is principally the refuse of the crates and packages from the docks is another source of livelihood. Scrap metal buyers and rag-pickers, etc. are an equally large group who make their living from collecting disused material from the public. The various pedlars of smallwares, the badge porters, flower-sellers and ice-cream vendors are the commonest other forms of street sellers. No doubt many of these occupations are interchangeable as particular trades are often slack or out of season. Less than a third of the hawkers were women. Whilst a certain number of hawkers appeared to come from the same family, it was rare for them to return joint earnings save in certain cases of husbands and wives who worked together. In only a few cases were Independent Workers, small shopkeepers or hawkers members of the same family.

AGE AND SEX DISTRIBUTION.

Apart from the hawkers and newsvendors, who have a very high percentage of adolescents in their number, the self-employers are scattered fairly evenly over all age-groups. The largest number were in the age-group 35–44, and the second largest number in that of 45–54. A high percentage of those over 65 still in work were self-employers. A majority of the women who were Independent

Workers were single, but those who worked in small shops were mostly married or widowed. One-half the businesses run by women were "subsidiary" to the chief source of family income: 38 per cent. of the "subsidiaries" amongst the Independent Workers and 65 per cent. of those amongst the small shops were run by women. Nearly half of these last were run by married women.

HOW FAR THE INCOME OF THE SELF-EMPLOYER IS A SOURCE OF INCOME FOR THE FAMILY.

In determining the present importance of the self-employer it is essential to find out how far it forms the chief source of his family's income and how far it is a subsidiary source of income. Taking all three classes together it was found that nearly two-thirds of the families concerned were dependent upon such earnings to the extent of at least half their income, while a third of them were wholly dependent upon them. In the case of the hawkers alone 50 per cent. of the families dependent on this source drew from it at least half their income. There was little difference between the small shopkeepers and Independent Workers as to the percentage who drew at least half their income from their earnings, but only a quarter of the small shopkeepers recorded their business as their only source of income compared with nearly 40 per cent. of the Independent Workers and of the families dependent on hawking. This is probably accounted for by the fact that so many of the shops are kept by women, and other members of the family are more free to obtain work outside the family business. In the above figures all sources of income are included with the exception of receipts from sub-letting, which in practice were found to be treated as a reduction of the outgoings for rent rather than a net addition to income.

TABLE I.

*Relation of Families of Self-Employers to the Poverty Line.**

	Total Families Sampled.	Total below "Poverty Line."	Per cent. below "Poverty Line."
Total Families (with known income) sampled on Merseyside	6,780	1,093	16·1
Total Families of Self-Employers * ...	610	68	11·2
1. Independent Workers	275	22	8·0
2. Small Shopkeepers	263	19	7·4
3. Hawkers, etc....	87	31	35·6

* The totals for this group are less than those for the sub-groups (1, 2 and 3) combined, as they include a few "mixed" families containing more than one kind of self-employer.

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* See footnote to Table V.

The Poverty Line adopted by the Survey is the income required to maintain a family of given age and sex constitution at a defined standard of living. It will be seen in Table I that the families of self-employers were as a whole distinctly better off than the whole sampled population. The hawkers were a very pronounced exception. The above figure suggest that their receipts are not large and that their livelihood is precarious.

PROSPERITY OF DIFFERENT TYPES OF SELF-EMPLOYER.

The question of the prosperity of the different types of self-employer has been examined in some detail. The weekly net income per business of the Independent Workers was 48*s.* 7*d.*, but for the hawkers it fell to 22*s.* In both classes the rent of the family's dwelling-house had to be met out of this "net income." In the majority of small shops, however, the owners lived on the premises and included the rent both of the house and of the shop in their expenses before estimating the net income. The average weekly net income estimated by the small shopkeepers was 53*s.* per business; taking the practice mentioned above into consideration, this figure should be raised to 66*s.* 8*d.* per business if it is to be compared with the net income of the Independent Workers and the hawkers. The figures for the hawkers are the average for each individual carrying on business for himself. The average weekly net income per family engaged in hawking was 28*s.* The net income per person employed as an Independent Worker was 42*s.*, and per person employed in a small shop it was recorded as 42*s.* 6*d.*, which should again be corrected to 55*s.* 10*d.* for purposes of comparison. If women are excluded the earnings of the Independent Workers and of the small shopkeepers do not compare at all unfavourably with the standard trade-union rates on Merseyside for skilled workmen. The receipts of women in family businesses were frequently above those earned by women who were not self-employers, although businesses owned by women were distinctly less profitable than those owned by men.

Table II gives some idea in detail of the prosperity of the different types of Independent Worker. Occupations such as dressmaking and laundering survive largely as "subsidiaries" to the family income and can thus face the competition of the big businesses. The receipts of washerwomen averaged only about 11*s.* a week, but the figure given for launderers was brought up by the inclusion of a few small Chinese laundries in the sample. The highest profits seem to have been obtained by the skilled workers.

TABLE II.

Average Weekly Net Income of Independent Workers.

Occupations.	No. of Businesses in Sample.	Average Weekly Net Income per Business.	Total No. Employed.
I. CHIEFLY MALE.		s. d.	
House Repairers, Decorators, etc. ...	53	64 6	62
Window-cleaners	25	50 0	30
Shoe-menders, etc.	22	47 9	25
Agents, Dealers, etc.	21	45 3	23
Carriers, Carters, and Motor-men ...	21	45 6	24
Furniture-makers, Wood-workers, etc.	16	53 0	17
Gardeners	13	42 7	14
Metal Workers	7	66 8	8
Chimney-sweeps	7	40 6	9
Other Skilled Manual Workers ...	22	66 2	25
II. CHIEFLY FEMALE.			
Dressmakers, etc.	30	25 9	33
Launderers	13	21 5	13
Music Teachers, etc.	13	25 4	13
Midwives and Nurses	12	56 2	12

TABLE III.

Average Weekly Net Income of Small Shopkeepers.

Class of Shop.	No. of Businesses in Sample.	Average Weekly Net Income per Business.	Total No. Employed.
		s. d.	
GROCERY AND GENERAL	63	39 2	76
(1) Large (33)		(50 2)	(40)
(2) Small General (30)		(27 8)	(36)
OTHER FOOD SHOPS*	58	61 2	78
(1) Greengrocers, Fruiterers (16) ...		(51 0)	(19)
(2) Confectioners, Bakers (14)		(65 4)	(20)
(3) Dairymen (14)		(64 2)	(23)
(4) Butchers (7)		(75 0)	(8)
TOBACCONISTS, NEWSAGENTS, ETC. ...	32	51 3	38
RESTAURANTS ... ... (Chiefly Fish-and-Chip Shops.)	30	60 0	38
CLOTHING SHOPS*	29	56 2	35
(1) Drapers (10)		(57 4)	(10)
(2) Old Clothes Dealers (8)		(36 9)	(10)
(3) Tailors (6)		(75 0)	(9)
HAIRDRESSERS	19	54 8	19
COAL-DEALERS	16	49 2	21
HOUSE FURNISHERS, ETC.	5	49 8	5
OTHER SHOPS	11	42 2	13

Includes others besides those under the sub-heads.

Table III is based upon the figures returned by the shopkeepers, and no attempt has been made to correct them to allow for the fact that the large majority who live over their shops deduct both the rent of the house and of the shop before estimating their net income. The following table, therefore, is not comparable with Table II. Section (2) of the grocery and general shops consists of those whose receipts supply less than half the family income. Apart from this group there are none with a very low weekly income.

None of the groups of hawkers were very large in number save the newsvendors. The newsboys made an average of just under 10*s.* a week, but the few adult newsvendors were more successful and brought the average for all newsvendors up to 14*s.* 8*d.* a week. Of other groups the fruit hawkers and the pedlars of small wares were the most successful. Their weekly net earnings averaged about 34*s.* and 27*s.* respectively.

TABLE IV.

Another Comparison of the Prosperity of Different Types of Self-Employer.

	Independent Workers.	Smal Shopkeepers.	Hawkers.
Percentage of businesses making—			
(1) 30*s.* a week and under	34·6	29·4	72·4
(2) Over 30*s.* a week and under £3 ...	38·0	39·8	25·0
(3) Over £3 a week	27·4	30·8	2·6
	100	100	100

Table IV shows that there is a high percentage in all groups not making more than 30*s.* a week. For hawkers the proportion amounts to nearly three-quarters of the total and nearly 53 per cent. were making only 15*s.* a week or less. The lead of the small shopkeepers shown above would be much more pronounced if adequate allowance could be made for rent (see p. 539).

SUB-LETTING AND OVERCROWDING.

Whilst it is the more successful Independent Workers and small shopkeepers who have their shops and workshops at a different address from their dwelling-place, this greater prosperity was often more apparent than real owing to the greater expense of maintaining two addresses. Sub-letting was found to form a frequent method of reducing expenses. The following table relates sub-letting to overcrowding. A family is considered overcrowded if it has not a certain minimum of accommodation, taking its sex and age composition into account.

TABLE V.

*A Comparison of Sub-Letting and Overcrowding.**

	Percentage Sub-letting.	Percentage Overcrowded.
Independent Workers	9·0	6·9
Small Shopkeepers	10·0	4·9
Hawkers	21·5	31·4
Total Self-Employers	10·8	9·5
Total Sampled Families in Merseyside	10·9	11·0

* The standards used by the Merseyside Survey to measure poverty and overcrowding are defined in the *Statistical Journal*, Vol. XCIII, Pt. IV, 1930.

It will be seen that self-employers sub-let as a whole as freely as other tenants or owners of whole houses in Merseyside, but that they were less overcrowded than the whole sampled population. The shopkeepers and Independent Workers have very low figures for overcrowding. The poverty of the hawkers apparently leads to widespread sub-letting which in turn helps to aggravate their overcrowding. For Liverpool alone they had an even higher figure for overcrowding amounting to over 37 per cent. of their total number.

RENTS PAID BY SMALL SHOPKEEPERS.

There was no evidence as to the rents paid by small shopkeepers for shops away from home. It was possible, however, to compare the rents of those living over their shops with the rents for whole houses which were not also shops. The median rent for a three-roomed house in Liverpool was compared with that paid for two rooms and a shop, and so on in other cases. In both Liverpool and Merseyside as a whole the small shopkeeper was found to pay a median rent of 18*s.* for his shop and the living premises above it, whilst the median rent paid for a whole house by the whole of the sampled population (excluding small shopkeepers) amounted to 10*s.* 2*d.* in Liverpool and 11*s.* 2*d.* for the rest of Merseyside. The additional rent for the shop was thus 7*s.* 10*d.* in Liverpool and 6*s.* 10*d.* in the rest of Merseyside. Far more shopkeepers owned their own house and shop in the other districts of Merseyside than in Liverpool.

It may be noted that the figure quoted above (18*s.*), for the median rent of a small shop with living premises above it, is apparently less than the figure (13*s.* 8*d.*) indicated for living and shop accommodation on p. 539. The difference is accounted for by allowing for (1) Small Shops located at an address which is not the home of the owner, and (2) Shops on premises inhabited and *owned* by the shopkeeper, in the determination of the lower figure.

OCCUPATIONS OF OTHER MEMBERS OF FAMILY.

The occupations of other members of the families containing self-employers were examined. Nearly 40 per cent. of the men attached to the families of the Independent Workers were skilled workmen, whereas 44 per cent. of those in the families of the small shopkeepers were unskilled manual workers. The unskilled formed an even higher percentage of those in the families of hawkers, and a quarter of the men in these families were casual. About 15 per cent. of the men in the families of the Independent Workers and of the hawkers were unemployed and 24 per cent. of those in the families of the small shopkeepers. Presumably they would lend assistance in the running of the shop, which was better able to bear the weight of carrying unemployed persons than other businesses of self-employers. A majority of the juveniles in the families of the Independent Workers and small shopkeepers went into progressive employment. A high percentage of those in the families of hawkers were unemployed.

SOCIAL SERVICES.

In view of the fact that a self-employer can only enjoy the benefits of the Health and Unemployment Insurance schemes if he pays both the contributions of an employer and of an employee, it is frequently asserted that the self-employer and his family do not have a fair share in the social services. This is felt very strongly on the part of a man who after paying his contributions for many years " sets up for himself " and then falls in need of the assistance to which he is no longer entitled. An attempt is made in the following table to find out how far the families of self-employers benefit from the social services and to compare the results with the figures for the whole sampled population of Merseyside.

It will be noticed that apart from the very high percentage of hawkers' families in receipt of Public Assistance, the families of Self-Employers have low percentages in receipt of Public Assistance, Unemployment Benefit and Health Insurance, with the result that they have high percentages in receipt of Old Age Pensions and War Pensions. It will be seen that whilst nearly half of the hawkers' families are in receipt of some form of social service, the percentages for the families of Independent Workers and of the small shopkeepers are very much lower than the 36 per cent. of all the families sampled in Merseyside who were found to be in receipt of some form of social service.

TABLE VI.

How Far the Families of Self-Employers are in receipt of Social Services.

	A. Independent Workers.	B. Small Shopkeepers.	C. Hawkers.	D. Total Self-Employers.	All Families sampled in Merseyside.
1. Public Assistance ...	2·9	6·0	32·6	11·3	16·1
2. Unemployment Benefit	23·8	19·4	16·3	20·3	27·5
3. Health Insurance ...	2·9	2·9	4·7	3·4	5·9
4. Widows' Pensions ...	6·0	10·4	11·6	9·1	8·8
5. Old Age Pensions ...	40·4	44·9	23·2	37·8	28·3
6. War Pensions ...	12·0	10·4	6·9	10·2	9·5
7. Miscellaneous ...	12·0	6·0	4·7	7·9	3·9
Total	100	100	100	100	100
Percentage of Families in Receipt of Social Services	22·4	23·8	45·6	25·6	36·2

CONCLUSION.

It might be urged that a certain amount of error must have crept into the information given by self-employers owing to their desire to hide their true position behind a veil of privacy. This factor must to some extent have biased the returns, especially perhaps in the case of the hawkers, whose experience of giving information as to income is usually limited to an attempt to convince relieving officers of the inadequacy of their means. It was found in the course of the Survey that the wages given when filling in the cards approximated very closely to the standard rates current in the district, which suggests that the recorded incomes were on the whole reliable. Even allowing for some slight exaggeration of their poverty the hawkers certainly remain one of the worst-off sections of the community.

Taking the families of the self-employed as a whole it was found that the majority of them drew at least half their income from their businesses. A far lower percentage than that for the whole sampled population were below the Poverty Line. The average weekly net income per business was in the neighbourhood of 55*s*. a week. The corresponding figure for Independent Workers exceeded 48*s*. a week, and for hawkers it was just over £1 a week; the small shopkeeper was above the £3 a week figure. Apart from the earnings of the hawkers, the earnings of self-employers—both men and women

—compared favourably with the standard rates for skilled work in the district. Sub-letting was as common amongst the self-employers as amongst the whole sampled population renting one house. Overcrowding was slightly less extensive amongst self-employers. A very much lower percentage of the families of the self-employer were in receipt of social services than of the whole sampled population. The hawkers were the chief blot on this picture. They suffered peculiarly from poverty and overcrowding (due in part to extensive sub-letting to try and ease their poverty). A very high percentage had to augment their income from the social services.

The keeping of a small shop was the most successful form of self-employment. It offered women their most favourable opportunity of earning a livelihood as a self-employer. Families keeping small shops appear to be fairly prosperous, not always because the shop brought in a large income but because it formed a solid basis to which the earnings of other members of the family could add. There has almost certainly been a decline in the number of family businesses in recent years, but there does not yet appear any sign that the multiple store is going to crush them out completely. On the contrary, they appear still to have plenty of vigour. For so long as the small shop provides a return of the present order, people will be tempted to set up in business for themselves, although many may fail through lack of ability and experience. From a social point of view self-employment offers members of the working-class an independence which their ordinary work does not always give them. Hawking, however, has no social advantages, as it cannot be pretended that the poverty and uncertainty of this occupation produces good citizens. To encourage a desirable element of the population it seems only right that the benefits of the social services should be put at the disposal of the self-employer as freely as at that of any other section of the population.

My thanks are due to Mr. Caradog Jones for his invaluable help and advice in the compilation of this paper.

REVIEWS OF STATISTICAL AND ECONOMIC BOOKS.

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1.—*The Economic Control of Quality of Manufactured Product.* By W. A. Shewhart, Ph.D. New York: D. Van Nostrand Co.; London: Macmillan, 1931. 9″ × 5¾″. xiv + 501 pp. 30*s.*

English statisticians have recently had an opportunity of hearing Dr. Shewhart's personal exposition of the utility of modern statistical methods in engineering. In the course of his work at the Bell Telephone Laboratories Dr. Shewhart gradually came to see the need for the application of statistical theory, and this book is the result of his experience.

The term quality is used in the objective sense as a measurable attribute of some product of the production process, while "*a phenomenon is said to be controlled when, through the use of past experience, we can predict, at least within limits, how the phenomenon may be expected to vary in the future. Here it is understood that prediction within limits means we can state, at least approximately, the probability that the observed phenomenon will fall within the given limits.*" The theory of control is based on the postulates that while chance systems of causes are not all alike, constant systems of chance causes do exist and that assignable causes of variation may be found and eliminated. The advantages to the large-scale manufacturer of quality control are reductions in the cost of inspection and of rejecting defective parts, the attainment of the maximum benefits from quality production, for instance by minimizing the variability of the product through control of the materials used in its manufacture, the attainment of a uniform quality even where inspection tests are destructive and a reduction in tolerance limits which will be the greater the more complete the control.

After an introductory section, Part II is devoted to ways of expressing quality, that is to say, to the presentation of data. This leads to the discussion of standard statistical methods; the mean, the standard deviation, the ordinary measures of skewness and flatness (kurtosis), the correlation coefficient and correlation ratio are here introduced, while for representing frequency distributions the author uses the first three terms of the Gram-Charlier series, which he has found satisfactory in most of his problems. The importance of Tchebycheff's theorem that the fraction of the observations contained within the limits $\pm t\sigma$ is greater than $1-\frac{1}{t^2}$ is rightly emphasized because of its independence of the form of the frequency distribution.

Part III on the basis for the specification of quality control starts with a discussion of the law of large numbers, from which it is concluded that *there exist in nature systems of chance causes which operate in a way such that the effects of these causes can be predicted by making use of customary probability theory in which objective probabilities in the limiting statistical sense are substituted for the mathematical probabilities.* This naturally leads on to a discussion of various types of statistical laws, and Pearson's system of frequency distributions and some others are enumerated. The necessary and sufficient condition for statistical control is said to be that the causes of an event satisfy the law of large numbers as do those of a constant system of chance causes. Maximum control is defined to be the condition reached when the chance fluctuations in a phenomenon are produced by a constant system of large numbers of chance causes in which no cause produces a predominant effect. The author concludes that there is no objective point of maximum control; while normality occupies a special place among statistical laws, it is not strictly speaking a necessary or sufficient condition for maximum control, but *approximate normality* of an observed distribution arising under *controlled conditions* may be taken as indicating that the cause system is in a state of maximum control.

Part IV is devoted to sampling fluctuations and the importance of practical sampling work is emphasized. It is a good elementary statement of the present position of sampling theory.

Part V deals with the statistical basis for the specification of quality. Three statistical estimates are considered necessary—the fraction defective, the mean and the standard deviation. In addition to knowing that the qualities of piece parts and raw materials are controlled, it is only essential to know the means and standard deviations of the distribution functions of the component qualities of a product. For instance, with this knowledge one may determine the design for minimum variability.

Part VI deals with allowable variability in quality. To determine lack of control where the standard distribution is already specified is a relatively simple problem. If this is not so, five criteria are cited to determine whether data come from a constant system of chance causes. In employing the first criterion we divide the data into "rational sub-groups," calculate for each group some statistical estimate (the estimate might be a mean or standard deviation or correlation coefficient), and we plot the estimates on a chart showing whether or not they fall within three times their standard error. The second criterion tests whether the difference between the variances within and between the groups is significant compared with its standard error. Here a more exact test might have been obtained by using the ratio and applying Fisher's "z" test.

The object of the third criterion is to determine whether there is a predominating cause of variability in a variable X satisfying the equation of control; this is done by correlating variations in X with variations in the suspected predominating factor. The fourth criterion has the same object and compares the variability of X in general with the variability under conditions in which we know that the suspected predominating factor cannot influence X. For example, the resistance of a carbon transmitter might depend on variations of the granular carbon, on variations in its piece parts or on variations in the manner of assembly. The general variation in resistance may be compared with the variation when each of these factors is held constant. The fifth criterion consists in fitting a frequency curve and applying the X^2 test, the only method when we cannot use "rational sub-groups."

Part VII is a summary of principles and practice. It contains discussions of the nature of good and bad data, of errors of measurement, and minimizing cost of measurement.

Where so much is good we may perhaps criticize one or two points. On p. 284 an estimate is said to be *consistent* if its expected value for any size of sample is equal to the quantity estimated. It is more usual to call this *unbiased*, a *consistent* estimate being one which tends to the quantity estimated when the size of sample is indefinitely increased. On p. 373 it is stated that the method of maximum likelihood gives too small a value for the standard deviation. This depends upon how it is applied. If the mean and standard deviation of a normal distribution be estimated simultaneously by the method of maximum likelihood we obtain for an estimate of the standard deviation $\sqrt{\frac{S(x-\bar{x})^2}{n}}$, but if the standard deviation be estimated by maximum likelihood from its own distribution we obtain $\sqrt{\frac{S(x-\bar{x})^2}{n-1}}$; the former estimate is a little too small, the latter unbiased. The difference appears to be due to a difference in the nature of simultaneous and separate estimation.

This book opens up what is largely a new field for the application of statistical methods and in time should have an important influence on manufacturing practice. J. O. I.

2.—*Taxation during the War.* By Sir Josiah Stamp, G.B.E., LL.D., Sc.D. Economic and Social History of the World War (New Series—British Series). xv + 249 pp. Published on behalf of the Carnegie Endowment for International Peace at the Oxford University Press by H. Milford, London. 1932.

The well-known volumes of the Economic and Social History of the World War produced on the initiative of the Carnegie Endowment for International Peace are not parts of a connected history of the war, but for the most part a series of monographs on particular war-time activities, and on methods of production and control. Most of them have been written by men who by virtue of their official positions actually directed or took part in these activities, thus preserving for future investigators material which otherwise might never be published, and the varied views of politicians, officials and representatives of industry on the vital and controversial questions which were continually arising. As one of this series, *Taxation during the War* amply fulfils its part, giving the reader a vivid idea of the difficulties and hesitations in imposing heavy taxation and of the attitude of Parliament, of business interests and of officials in meeting the emergencies and unprecedented measures of war-time finance. Although completion of the work has been delayed many years by the numerous calls on the author's time, the bulk of it was written whilst the proceedings were fresh in his mind with full access to contemporary notes and documents, the earlier attempts to reach the solution of a problem having been preserved. He has been careful to avoid *ex post facto* wisdom; and judgments, where he has thought fit to pass them, have, as a rule, the quality of detachment.

The book falls into two distinct parts: the first in narrative form describing the system of taxation in force before the war and its development under the stress of war finance; the second discussing the new measures, especially the excess profits duty, in respect of principles, administrative difficulties, and their reaction to and upon public opinion and business interests. There is little co-ordination between the two parts, and they might have been printed as separate books. The chronological review in the first part will save the future historian much trouble with Hansard and other sources in his studies of the psychological reactions of the British public to the efforts and sacrifices of the war, and the facts and theoretical discussions in the second part will be a source of information and inspiration to future writers on public finance. The book is not one that will attract the casual reader. It is packed with facts, figures and quotations, and in the second part with closely reasoned statements. Inevitably there is some repetition as between the two parts.

The first chapter gives us a review of British taxation in the years before the war. The great Liberal victory of 1906 brought taxation to the forefront as a political question. The principle of progression was accepted in the adoption of the super tax; and the introduction of health and unemployment insurance and improvement of education led to increases of the rates of death duties and income tax, whilst a prolonged parliamentary battle was fought over the land values duties. Mr. Lloyd George, Chancellor of the Exchequer, spoke of his fifth budget in 1913 as colossal and gigantic, though the total was but £195,640,000, and deploied the rise of the expenditure on armaments in the past fifty years from £28,125,000 to £74,500,000. The next year's budget saw the estimated revenue pass the £200,000,000 mark. The raising of the income tax in time of peace to 1*s.* 3*d.* in the £ was admitted to be an intolerable burden. The adoption of the Finance Bill of 1914 was immediately followed by the outbreak of war; but the war was financed by borrowing until December, when the income tax rate was doubled and the duties on beer and tea increased. Although additional taxation was imposed in February and July 1915, it was not till September of that year that Mr. McKenna in his first budget introduced real war taxation. The debates and press discussion over the increase of income tax to 3*s.* 6*d.*, the introduction of the excess profits duty, and the imposition of new customs duties are narrated in some detail, and give the reader an excellent idea of the hesitation and apprehension which was felt about forcing on the country really heavy taxation. In 1916 the daily cost of the war was still mounting ominously and borrowing was on an enormous scale. Members of Parliament repeatedly criticized the wastefulness and extravagance of Government expenditure. The income tax went to 5*s.*, but with a generous allowance on earned income; taxes on amusements, railway travelling, and mineral waters were introduced and others, except beer and tea, were raised. The excess profits duty was raised from 50 to 60 per cent. The munitions levy was handed over to the Inland Revenue Department for administration; and munitions firms became liable for this or excess profits duty whichever was higher.

The fourth chapter, "Paying the Bill," gives an account of Mr. Bonar Law's budget of 1917. The excess profits duty was raised to 80 per cent., and everyone had recognized the necessity of heavier taxes. The total estimated revenue was now £638,000,000. The growing interest on the national debt was a source of anxiety. Chapter V, entitled "The Last Year and the Final Effort," gives us the 1918 budget with its estimated revenue of £842,000,000. The revenue of the preceding year had exceeded the estimate; but increases of customs and excise duties were now necessary. Interesting summaries are given of the debates on the proposed luxury tax, which failed to mature, and on Lord Arnold's advocacy of a capital levy. In the end the Finance Bill contained no new taxes. A paragraph on the after-war budgets concludes Part I of the book. It is a detailed chronological record of the taxation measures, which will be of great service to the serious student, though his time would have been saved if the chapters had been divided into sections appropriately labelled.

The second part is in a different style. It begins with a succinct statement of the British scheme of taxation as it was before the war, and proceeds with some discussion of the modifications introduced during the war. The author has allowed himself here some critical discussion of war-time financial measures which his plan barred from the first part of the book. "The very high rates of duty which war finance necessitated," we read, "made obvious and insupportable various anomalies and defects which had hitherto escaped practical attention. Such, for example, was the effect of a change of abatement at a particular level of income, where one with an income just over the limit was positively worse off in his net income than one who fell just below it owing to the diminution or cessation of his allowances. This was met in 1916. . . ." The allowance for children, first introduced, as the author notes, by Pitt in 1798, but dropped in 1806, and revived in 1909 at £10 for each child, was increased to £25 in 1915.

The second chapter of this part is of exceptional length, occupying more than a quarter of the book. It is, in fact, a monograph on the Excess Profits Duty, a tax which became necessary not merely for revenue purposes, but on account of the unrest created amongst workers by the unusual profits on food and the necessaries of life due to rising prices. At first people approached the problem as one of taxing the increased income of individuals, but since the income tax relies on deduction at the source, a special tax on surplus incomes could not be combined with ordinary income tax. Gradually it was realized, however, "that it was the *amount* of profits, rather than their cause or character," and profits as distinct from incomes, that must be the subject of charge.

Then follows an account of the examination by Treasury officials, and largely by the author himself, of the problem of taxing increased profits, which gives an insight into the difficulties which confronted officials who had to evolve a workable scheme for a wholly new tax, and one which on account of the heavy percentage to be taken was likely to be resisted and evaded. Close attention had not been necessary previously to the *precise* determination of the profits of a particular year, because the system of averages was generally used for income tax purposes. The assignment of a bad debt to one year or another might, for instance, become a matter of importance. Conservative accountancy tended to minimize stock values at the close of the year; and again, since excess profits were calculated after deduction of the standard percentage on the capital employed, based on the rate of profits in the trade in the pre-war years, the taxpayer wanted his profits stated as high as possible in the latter, and as low as possible in the war years. Fortunately this meant that the interests of taxpayers as a whole were rarely identical, and a principle advocated by one was as vigorously opposed by another. Since revisions of the percentage standard could not be claimed by individual firms on appeal to the Board of Referees, there arose an astonishing number of "trades." This chapter is the most important in the book. It could not have been written by anyone else; and the author has given of his best, with that skill in handling problems of finance for which he is justly famous.

The concluding chapter contains an interesting discussion of the wisdom and necessity of inflation. The author's view is that the illusion of prosperity, and the incentive to production created by inflation, have a real value in war-time, provided it is not allowed to get out of hand; and that unrecognized taxation of this kind is probably inevitable in a long and grim struggle. There are three appendices giving documents and part of the report of a hearing relating to the excess profits duty; and a fourth containing statistics of revenue during the war years and of the excess profits duty and munitions levy. An index of names occupies a page, but the index of subjects hardly more than half a page. It is unfortunate that a work of permanent value should not be furnished with a useful index. In spite of some deficiencies, *Taxation during the War* is likely to remain a standard work of reference and should be read by every advanced student of public finance. H. S. J.

3.—*The Financial Aftermath of War.* By Sir Josiah Stamp, G.B.E., etc. London: Ernest Benn, 1932. 8½″ × 5½″. 154 pp. Price 6*s*. net.

The author apologises for this book, which was originally delivered as five lectures to students at Aberystwyth University, saying that he would have been reluctant to print them but for an obligation to publish attached to the lectures. He regards them as elementary, expressed "in the simplest and most elementary terms I could command," and hopes that they may be useful to persons who are not experienced students, and particularly in the higher forms of schools. There are five chapters, corresponding to the lectures, on Taxation, Inflation, Deflation, Reparations, and Debts, internal and external, and a broadcast address is added on "The Gold Standard." Finally, a short list is given of books which would be useful for further study. It would have been advantageous if some suggestion had been made as to a course of study introductory to the present book, for most of the trouble in international economic relations in the last dozen years has been due to ignorance of elementary principles of political economy. Had the eminent statesmen who perpetrated the financial arrangements of the Peace known anything about the bases of international trade we should have been saved much misery, and where they refused to learn the crowd can hardly be blamed for expecting fairy gold. One might hazard the advice that the teachers of the higher forms in schools who may be proposing to follow Sir Josiah's excellent suggestion should first give their pupils a short sketch of the principles of economics from any of the numerous text-books which are available. Layton's *Money and Prices* and the expository parts of the Macmillan Report (both of which are in Sir Josiah's list) will give the mechanism of exchange, and Sir Josiah's lectures will then be followed with understanding. But, let no one make any mistake; the subject is a difficult one, despite the best efforts at simplification. It is important to get correct ideas in these days when "controlled inflation" and "reflation" are on everyone's lips. On this point Sir Josiah's concluding words should be pondered: "The mere monetary expressions and statements which we make on all these financial questions are not in themselves anything real or final; they can only denote a movement of goods and services with human effort behind them, and it is that human change that we have to keep our eye upon."

On p. 86 there is a misprint of "1929" for "1926." On p. 141 there is the correct statement that "we left silver for gold in the nineteenth century"; the reference, of course, is to the Act of 1816, but a good case could be made out for the contention that we really had been on a gold standard for a considerable time previously.

H. W. M.

4.—*Recovery, the Second Effort.* By Sir Arthur Salter, K.C.B. London: G. Bell & Sons, Ltd., 1932. $8\frac{3}{4}'' \times 5\frac{1}{2}''$. xvi + 306 pp. 10*s.* 6*d.* net.

Sir Arthur Salter is a man of wide sympathies, one who sees "sermons in stones and good in everything." Recognizing, what is too often forgotten, that the present crisis is political as much as economic, he gives us a penetrating analysis of the states of mind of the leading nations since the War and incisive characterizations of the principal statesmen who in turn have played their parts on the European stage. From these we may learn much, most notably that the mistakes of the past were quite natural in the circumstances and were in great part due to the inability of the leaders to control the whirlwinds they had raised. Or rather, one might compare these great men to the *famulus* of the legend, were it not that he perceived his mistake and tried to lay the devil he had raised, whereas they were either too blinded by passion to see their errors or too timid to try to undo them. It is not to be supposed that Sir Arthur is superior to human frailty, for he, like all the world, was taken in by Ivar Kreuger, and, bearing this in mind, one is tempted occasionally to disagree with some of his estimates and opinions. It is disconcerting, for example, to see that some of the advances which we made—the Balfour Note is one instance among others—are regarded by one so intimately acquainted with events as they happened as cases where "Great Britain undertook prematurely and unilaterally a commitment, which would only have been wise as a part of a general scheme accepted by others and comprising equal contributions by them."

The particular merit of Sir Arthur's account of the present economic situation is that he relates it organically to the pre-existing structure. Before the War, he thinks, we had an automatic system for regulating trade and industry "in which supply adjusted itself to demand under the stimulus of competitive gain, with the guidance of changing prices." Gradually, this ideal system of *laissez-faire*, which was never so frictionless as he seems to suppose, was interfered with, by factory legislation to protect the weak, by social legislation to raise the standard of life, by trade union action to maintain wages, and by industrial combinations to keep up prices. These last two factors, in particular, hampered the power of the financial authorities to continue as before to regulate our balance of international payments by operating on the exchanges through movements of the bank rate. Had the War not happened some adjustments of our economic organization would have been, without doubt, gradually achieved, but catastrophe overtook us when *laissez-faire* had broken down and a planned economic system had scarcely been conceived. The moral, as Sir Arthur very strongly emphasizes, is that no mere tinkering, no simple idea of "getting back," will suffice. The body corporate is sick in many places and a plaster here and there will be of no avail. Sir Arthur plans, therefore, for complete economic reconstruction, and, as he has had an unequalled familiarity with our international arrangements and with the personages with whom agreement must be made, his views on such matters as war debts, reparations, disarmament, must be accorded a large measure of authority. On monetary and industrial reconstruction he would himself reject any claim to an oracular position, and most of his suggestions have already been advocated by persons whom he would regard as more qualified than himself. His especial merit is that he has tried to see the huge diversified problem as a whole and to plan accordingly. It is not possible even to give a list of his suggestions; though without comment it would still be long. One can only say: "Read the book, and, whether you agree or disagree with it, you will be the better for it." H. W. M.

5.—*Modern Currency and the Regulation of its Value.* By Edwin Cannan, Emeritus Professor of Political Economy in the University of London. London: P. S. King and Son, 1931. 7¾″ × 5¼″. viii + 112 pp. 5*s*. net.

One welcomes a new book by Dr. Cannan were it only as a proof that withdrawal from active professorial work was not due to any abatement of his natural strength. As of old, he lays about him with the gusto and vigour of a Crusader chastising the heathen, and, as always, the performance is productive of pure delight even if one's own crown comes in for some shrewd knocks. He is no respecter of persons, and notes, "without regret," that this book was almost through the press before the Macmillan Report was published; he almost makes "monetary experts" a term of reproach and seems to class all bankers and most writers on money in that category.

"The chief purpose of the present work" is, he says, to show that the policy of limitation of currency can be abandoned "without giving up the gold standard, which in the present age is to be treasured, not only because it is convenient for international commerce and other financial relations, but also because it prevents the perpetual interference with domestic currency values which would otherwise come from petty national politics." His apology for repeating much which he had already published is quite unnecessary. The large and increasing demand for monetary gold is, he holds, "absolutely under the control of the gold-standard countries. By their present policy of rapidly accumulating gold in their central banks the gold-standard countries are raising the value of gold. By reducing their purchases of gold, and still more by abandoning further accumulation altogether, and even more still by selling some of the quantity already accumulated, they would reduce the value of gold." By increasing fiduciary currencies "gold and the gold-standard currencies must inevitably fall in value together and simultaneously." The greatest obstacles to the adoption of "sound policy in the regulation of the gold-standard currency" are the mercantilist worship of gold as such and "the superstition and muddle-headedness which cause belief that to have a reserve of gold large in proportion to the notes outstanding is desirable." The attribution of the present troubles to the accumulation of gold in certain countries as a result of reparation payments is "a red herring." The assumed but erroneous view that the rate of interest and the value of money (price-level) are closely and directly connected adds to the confusion, and the control over prices that can be exercised by manipulation of the Bank Rate is illusory. "The galaxy of banks worshipping the bank rate cannot prevent other institutions and private persons from buying and selling investments and using their own property as they will. So long as this freedom exists, the bankers' usual belief that they are compelled by circumstances to submit to certain rates of interest seems much more true than the 'monetary experts'' theory that the rates are imposed by fiats of the central banks' parlours."

"One of the most destructive of all modern delusions" is the idea that the amount of money in current accounts at banks should be added to currency as being purchasing power. There is no large unused fund; there is no firm distinction between time and current deposits; modifications of bank practice can alter the apparent amount of deposits; there is no difference between savings banks' deposits and joint-stock bank deposits. Here one would fain contest some of Dr. Cannan's views, but this arena is too contracted for a pitched battle; one must simply let him deploy his troops. "Last, but by no means least, among obstacles to improvement in monetary policy we have the fact that it is frequently assumed—often quite unconsciously, but none the less confidently—that movements of prices are never, either in direction or degree, the result of a general mistake," and that if changes in prices do not immediately follow changes in currency the theory must be wrong. This opinion is contrary to all our experience of what occurs in a trade cycle. "But the most complete conviction that slumps may be introduced or intensified by non-monetary causes need not in the least induce us to doubt either the well-established proposition that failure to increase the quantity of currency sufficiently to meet the needs of an increasing population is a cause of depression, or the main thesis of this book—that the present failure so to increase the currencies of the gold-standard countries can quite easily be overcome by the general will without any abandonment of the gold standard and without complete unanimity or definite agreements on the part of the countries concerned." H. W. M.

6.—*The National Gain.* By Anders Chydenius. Translated from the Swedish original, published in 1765. With an introduction by Georg Schauman, Ph.D., Director of the University Library, Helsingfors, late Lecturer in the History of Political Economy at Helsingfors University, Member of the Finnish Parliament. London: Ernest Benn, 1931. 8" × 5½". 92 pp. 5s.

Chydenius (1729–1803) was a Finnish pastor who interested himself in national politics, supported liberty in trade and religion, and, in addition to several volumes of sermons, wrote a few pamphlets of economic interest. *The National Gain*, here translated, covers 48 small pages of large print and can be read in half as many minutes. Its argument is that the Swedish nation suffers loss from laws and regulations in restraint of trade, adduces some local instances in support of this contention, and concludes that "the more liberty is allowed to reign in trade the greater is always its increase."

It is claimed for Chydenius that he was a profound and remarkable economist, that eleven years before the publication of Adam Smith's *Wealth of Nations* he expressed even more clearly than Smith the follies of export bounties, trade regulations and the like, and that it was only because he wrote in Swedish that he has escaped world-wide attention.

That any serious student of the history of economic thought should endorse these claims is hardly credible. Cossa, it is true, describes him as the "author of excellent monographs in defence of the liberal theories developed later by Smith," but the same can be said of a succession of writers from Dudley North to Josiah Tucker, to say nothing of the Physiocrats who had been harping on this string for some years before 1765. If we are to judge Chydenius by the work now translated (the only one I have been able to read) we must conclude that he was neither original nor profound, and that if, as Dr. Schauman maintains, he towers above all the rest of the Swedish economic writers of his time, he was merely a trout among minnows.

The doctrine of natural liberty was in the air in 1765. Philosophers, lawyers, economists, publicists were broadcasting it everywhere. Chydenius, according to his biographer Bishop Tengström, was "not what is really called learned." He knew no language but his own, but refers to Swedish translations of Montesquieu, Tucker, and Mirabeau, which is enough to show that he was no innovator. When it is pleaded that his chief merit was intellectual simplicity, as much may be said for the fishermen and peddlers whom he championed. Their alehouse talk about the restrictions imposed upon them was probably equally simple and direct. *The National Gain* is now introduced to a wider public, but if it had originally appeared in English it would have earned for the author only a place among the minor writers on economic subjects.

The preface to the volume, equal in length to the text which it introduces, is interesting for its references to other Swedish writers. We are told that the first professor in political economy at Uppsala, Anders Berch, issued a systematic exposition (in Swedish) of his science in 1747, *Introduction to Political Economy*, which obtained for its author the membership of the Economic Societies in London and Berne. It would be interesting to know what exactly this "Economic Society in London" was. Berne we know, but London is distinctly intriguing. H. H.

7.—*Valuation and Surplus.* By R. K. Lochhead, Fellow of the Institute of Actuaries. Cambridge: University Press, 1932. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. xiii + 99 pp. *7s. 6d.*

In the earlier stages of their work actuarial students are concerned with the solution of mathematical problems relating to life contingencies, compound interest, etc. For this the student is fully equipped by the Institute of Actuaries with authoritative text-books covering the whole of the mathematical field with which he is expected to make himself acquainted. When, however, he has to consider the application of these principles to the practical problems arising out of the administration of life assurance offices, friendly societies and other institutions which have been built on an actuarial foundation, he is faced with this difficulty. He is leaving the region of mathematics and exact thought for that of opinion and judgment and controversy. There is no scope for an authoritative text-book on matters which have been for many years, and still are, subjects of debate and discussion. There is, of course, a considerable literature on these subjects, but it is buried in the form of papers and discussions published in the *Journal of the Institute of Actuaries* and other similar professional records. In the past the student has therefore had to make the best of this mass of miscellaneous literature without any guidance as to the significance of the various papers. It is at this stage that Mr. Lochhead's book should prove invaluable to him. Mr. Lochhead, as it were, takes him by the hand and guides him through a mass of disconnected material, pointing out with an expert hand what is important and showing the historical and logical connexion between theories put forward by earlier generations of actuaries and those which prevail at the present time. This is not the place to examine the technical problems the papers on which are the subject of this book. Mr. Lochhead shows a clear grasp of the subject and has done his work with great ability and discretion. He has resisted most successfully the temptation to air his own views.

It is interesting to note that this book is one of a "consolidation of reading" series published for the Institute of Actuaries Students' Society. The Society and the author are to be congratulated on a notable contribution to the educational literature of the actuarial profession. C. R. V. C.

8.—*Business Statistics.* By John R. Riggleman, Senior Economist, United States Department of Commerce, and Ira N. Frisbee, Associate Professor of Economics, University of California. London: McGraw Hill Co., 1932. $9'' \times 5\frac{3}{4}''$. xix + 707 pp. *24s.*

The utilisation of business statistics involves work of widely varying grades, and makes demand upon widely different aptitudes. At the one extreme there is the collection, analysis, and presentation of crude data relating to purchases, output, sales, stocks, etc., involving simple comparisons in place or time. Some care is required in the classification of data so as to yield significant results, and simple adjustments are necessary in the interests of comparability. For the most part, however, this work involves nothing more than familiarity with simple numerical and graphical methods. At the other extreme there are problems involving highly skilled professional knowledge. An engineering concern must explore the possibilities of quality control, and a fertilizer concern analysis of variance, etc., etc. In between, there are problems like forecasting, market analysis, and executive control and management, which lay greater demands upon judgment and knowledge of the business than upon skilled technique. It is essential, however, that technique should be available when required. Knowledge of mathematical methods does not imply that these should be used on every occasion. A trained man will know how to dispense with refinements and complications when these are avoidable, and will take short cuts when an untrained man will be floundering about in a mass of ill-digested and ill-understood figures.

Whatever may be true of business in the aggregate, refined statistical methods are usually misplaced so far as the individual business is concerned. Data are unstable and inexact (in the statistical sense). Policies and methods must continually change. Decisions are usually based upon broad considerations, and elaborate analysis is only appropriate in marginal cases. Every effort should be made to keep issues clear and comprehensible.

It has been necessary to begin with these remarks, since both the academic writer without actual business experience and the popular writer without a proper theoretical background will tend to exaggerate the possiblities of statistical methods. Much is made of the success of statistics in business problems and little is heard of its failures. Every investigation means time and money. It is not always worth it and the economics of the subject are not always effectively studied.

Messrs. Riggleman and Frisbee's work provides an introduction to theory coupled with a large selection of practical problems based upon actual cases. The student will be able to familiarize himself with the details of market analysis, real estate appraisals, budgeting, forecasting, and the like. The general make-up of the book is attractive, and there is an excellent bibliography. It is free from the dubious features to which attention has been drawn. It is the best all-round introduction to the subject of business statistics that has come to the reviewer's notice. L. R. C.

9.—*Railway Economics.* By K. G. Fenelon, M.A., Ph.D. London: Methuen, 1932. 7½″ × 4¾″. xii + 228 pp. *5s.*

Transport and Communications. By K. G. Fenelon, M.A., Ph.D. London: Pitman, 1931. 7½″ × 5″. ix + 101 pp. *2s. 6d.*

In the larger of these two volumes Dr. Fenelon deals with English railway operation in all its details; in the smaller volume he discusses, in a more popular way, railways, canals, road and air transport and the Post Office. English railways differ from foreign railways because they lay themselves out for retail trading and have "built up a quality of service unsurpassed by the railways of other countries." Of course small lots and rapid deliveries mean higher costs. Foreign railways "handle more bulk traffic, large consignments, and full wagon loads." In Germany the average net train load is 290 tons, as compared with our 130 tons. In foreign countries Parliaments have helped railways, in this country Parliament has hindered them. It still imposes rules applicable to the period of monopoly which has now passed away, but leaves their road competitors practically unfettered, if not actually subsidized by the ratepayer. The vast increase in English railway expenditure is partly due to Parliamentary or Government action. Expenditure has risen in seventeen years from £75½ million to £170¾ million. In 1913 salaries and wages took 7*s*. 3*d*. in the £ of gross revenues, or 36 per cent., leaving 7*s*. for interest and dividends; in 1930 they took 11*s*. 1*d*. in the £, or 55 per cent., leaving 3*s*. 10*d*. for interest and dividends (if any). Why does Dr. Fenelon say that railway capital is in shares "usually of £1 in value"; and why does he speak of "Preferred" Stocks as Trustee securities?

Going back to the earliest railways he quotes George Stephenson—"Where combination is possible, competition is impossible." For many years Parliament could not see this fact, though the companies made pooling arrangements; now Parliament has reversed its policy and is inclined to *force* co-ordination not only between railway companies but between railways and road concerns. Dr. Fenelon has much to say about the handicaps under which railways work in competition with road transport, such as the "undue preference" rule. Why is it that on railways "soldiers, workmen, and other classes of traffic may have to be carried at unprofitable rates," while no similar obligation is imposed on road vehicles? Dr. Fenelon does not answer the question, Why can a road concern quote lower fares or charges than a railway company? Nor the related question, Do the various classes of motor vehicles make an adequate payment for the use of the public roads?

Dr. Fenelon discusses very fully such questions as the basis of railway charging, *e.g.* "cost of service," which he dismisses, "zoning," which is only appropriate in special cases, and "what the traffic will bear," which is the best principle, since it really means not charging more than the traffic will bear. For Lord Weir's report on railway electrification Dr. Fenelon has little use. He still believes in the steam locomotive for main line working, and he thinks that the oil-electric locomotive offers nearly all the advantages promised by electrification without its enormous capital cost. One reads a good deal about the development of road services in connection with railways; containers, too, have proved most serviceable, giving in effect house-to-house delivery; another example of railway enterprise is "railhead delivery." These various new services make the railways "not merely carriers, but, in a sense, retail distributors." Dr. Fenelon reckons the all-in cost of a 32-seater motor bus at 1*s*. per mile, of a steam rail car (60 seats) also at 1*s*., while a small steam train on a branch line costs from 1*s.* 6*d.* to 2*s.* per mile. Most criticism of our train speeds is uninformed. Dr. Fenelon says that in train speed our railways lead the world.

In *Transport and Communications* Dr. Fenelon travels lightly over wide territories which he has already explored more carefully in earlier works. The book is meant, no doubt, for young students, who will find it useful. J. E. A.

10.—*London's Passenger Transport Problem.* By Gilbert J. Ponsonby, M.A., Assoc. Inst. T., Assistant in Transport at the London School of Economics and Political Science, London: P. S. King and Son, Ltd. 8½" × 6". 106 pp. 3*s.* 6*d.* net.

Mr. Ponsonby is a strong advocate of the London Passenger Transport Bill, and evidently is of the opinion that Parliament at long last is to deal effectively with London's passenger transport problem.

The author analyses the causes which he considers have led in some cases to over-investment of capital and in other cases to under-investment, and the subject-matter of the book is an attempt to answer the question as to why capitalist enterprise, here and there in competition with municipal tramways, has failed to give satisfaction either to the public, the managements, the workers, or even to the proprietors themselves. He criticizes the policy of the London and Home Counties Traffic Advisory Committee, which was set up under the London Traffic Act, 1924, in regard to their recommendations in favour of the restriction of omnibus competition, but many may think that the arguments which he quotes in favour of restriction are stronger, in all the circumstances, than those which he advances in support of unrestrained competition. In connection with the demands of certain local authorities for additional transport facilities in the form of more tube railways and further electrification of suburban lines, the author suggests that one of the principal reasons why these additional facilities have not been provided lies in the fact that the railway companies were unable to obtain a guarantee of further restrictions which would have rendered likely a reasonable return on the capital expenditure involved. Here again he considers that restriction is not the proper solution of the problem and he expresses the belief that had the railway companies been at liberty so to adjust their charges, including season ticket rates, between the peak and valley hours as to ensure adequate remuneration of capital, those responsible would not have asked for restriction of competition. It may be observed, however, that Mr. Ponsonby does not quote any evidence in support of his belief, and it is probably true to say that the railway companies have never indicated that they consider the difficulties could be solved in this manner. The author refers to the inadequate road transport facilities in the London area, and in this connection he blames the road construction policy of recent Governments. He submits not only that there has been a general misapplication of the country's resources as between road works in all built-up areas, such as London, and road works for long-distance road transport throughout the country, but also that to a certain extent within the London Traffic Area itself the wasteful consequences of this general policy are no less apparent. Mr. Ponsonby considers that in order to ensure the proper development of London's transport systems any scheme which is adopted should (1) make provision for the financial fusion of the Underground Group, all the omnibus undertakings, and the tramways, and (2) bring about such a relationship between these transport agencies and the main line railways as will remove that element of uncertainty as to the future which has to an important extent been responsible for the reluctance to electrify suburban lines. An important omission from Mr. Ponsonby's present work is the question of the cost, and its incidence, of providing improved roads, effecting widenings of streets, and instituting major alterations, necessitated primarily by the operation of road motor passenger vehicles.

The book has been published at an appropriate time and it will be read with much interest not only by those responsible for passenger transport in London, but also by others with similar responsibilities elsewhere, and by students of transport matters.

A. E. K.

11.—*Le Port de New-York dans son rôle économique.* By Gaston Eyskens, M.Sc. (Bibliothèque de l'École des Sciences Commerciales de l'Université de Louvain.) Louvain: René Fonteyn, 1929. 10″ × 6½″. 395 pp.

The author of this work spent two years in America, visiting numerous United States and Canadian ports situated on the Atlantic and Pacific seaboards, and also those on the Great Lakes. He commences the first chapter with the following quotation from E. J. Clapp, " There are two sorts of seaports along the Atlantic coast: New York and all others." This is the theme running throughout the three sections of the book and is responsible for the writer's frequent description of New York as " the World's Metropolis," " Queen of the Hudson," " the greatest of all cities, the largest of all ports," " the Commercial Pivot of the World," etc., etc.

In Part I the analysis of (*a*) the movement of shipping and of passengers, and of (*b*) the quantities and values of the commodities, imported and exported, at New York, does certainly show the pre-eminent position held by that port in comparison with other ports in the United States. The statistical tables of tonnage entered and cleared with cargo are in respect of 1926 and 1927, and they show that the movement of shipping at New York was then almost four times as great as that recorded for New Orleans, the port which most nearly approached it in importance. In the foreign trade New York accounted in 1927 for about 35 per cent. of the total tonnage entering United States ports and about 42 per cent. of the imports and exports by value. The figures show not only the supremacy of New York as a port, but they also indicate for the years mentioned a satisfactory state of " balance " between entrances and clearances (*i.e.* vessels were assured of a cargo for their return journey). The table in which a comparison is made between the aggregate of the entrances and clearances in cargo or in ballast at New York and at certain other important world ports is not altogether satisfactory, as, apart from the economic changes affecting shipping which have taken place since 1927, international comparisons of shipping on a tonnage basis need careful adjustment. In that year New York, Rotterdam, Antwerp, London, and Hamburg appear to have been of about equal importance as ports of call in world trade. The coasting trade at New York amounted to 41 million tons in 1927, entrances being 28 million tons and clearances 13 million tons. More than a million passengers arrived or departed at New York during the fiscal year ended June 30th, 1928, the diminution in the number of immigrants consequent upon the Immigration Restriction Acts being, probably, offset by the increased numbers travelling on business or for pleasure. The world trade passing through the port in 1927 is analysed in detail (*i.e.* by individual commodities imported or exported). It is a pity that this section of the book has so soon become out-of-date.

Part II is mainly historical. It recounts the fundamental causes which have determined the place which New York occupies as a trading centre. Apparently the Bay of New York was discovered by the Florentine Giovanni da Verrazano, sent out by Francis I, in 1524. His discovery was followed by the Belgian and Dutch settlements. It is interesting to read that a certain Belgian, one Peter Minuit, bought in 1624 for 60 florins the island of Manhattan (where to-day a square foot of land is worth a small fortune) and founded the city of New Amsterdam. Forty years later the city capitulated to the fleet of the Duke of York (representing " perfidious Albion ") and was renamed New York after its conqueror, a brother of Charles II. The Dutch finally ceded the Colony to the English by the Treaty of Westminster in 1674. The development of the immensely rich hinterland behind New York is the subject of an interesting chapter, whilst the growth of land and water transport (railways, canals, etc.), all leading to a common centre, is fully dealt with. Another chapter is devoted to a detailed examination of the various shipping lines using the port. The remainder of this section describes the natural advantages possessed by New York, the mechanical equipment for handling goods, berthing facilities, grain elevators, tunnels and bridges, ferry boats and all the appurtenances for facilitating the speedy entrances and clearances of vessels of all types bringing cargoes of all descriptions and passengers of all classes.

In Part III the author discusses the future development of the port. As in the case of London, the lack of co-ordination among the authorities concerned with transport (of which we have heard so much recently) has created a first-class problem of reorganization of local and dock transport in New York. The inevitable congestion of goods and passenger traffic has resulted. As regards the transport of goods, one problem in New York appears to be the necessity of eliminating from the vicinity of the docks traffic which is not concerned with the loading or unloading of vessels, whereas a difficulty in London is the inadequate means for moving goods from dock to railway terminus or warehouse. The recommendations of the New York and New Jersey Port and Harbour Development Commission are considered in detail. This body has reported on the automatic electric system, proposed goods stations, transport of perishable goods, docks, warehouses, terminal charges, etc., etc. A full chapter is devoted to railway tariffs, which appear to exercise a very powerful influence on the ultimate cost of the goods transported into or out of the port, a controversial issue in which, no doubt, the political aspect of the day manifests itself. The last chapter is speculative as to the future of New York; various projects, such as a canal from the Great Lakes to the Atlantic, the improvement of the Mississippi, and the rivalry of New York and Montreal for the grain export trade, are considered. On the whole the writer is of the opinion that New York will more than hold its own as the premier port of the American continent.

There is a full bibliography and table of contents. The author's style is admirably clear and the matter well arranged. T. P.

12.—*Die Übererzeugung in der Welthandelsware Kaffee im Zeitraum von* 1790–1929. By Dr. Hans Roth. Jena: Gustav Fischer, 1929. 9½″ × 6½″. viii + 146 pp. 6 *Mk.*

This study first appeared in 1925 and has now been brought up to 1929. The main part of the book is taken up with an historical account of the market for coffee. There have been two periods in which the market was free, 1790–1830 and 1870–1909, and two periods when it was controlled, 1830–1869 and 1909–1929. At the beginning, 1790–1799, production was insufficient to meet the demand and then during 1800–13 trade was disturbed by the Napoleonic wars. Then for four years there was a balance between supply and consumption, followed by six years of under-production which led in turn to new planting and about seven years of over-production. The Netherlands Trading Co., founded in 1824, then acquired a monopoly of the Java coffee crop in the Netherlands, and, as the Java coffee was a third of the world's supply and was of the best quality, the market was subject to control for the next forty years. That control did not always effect a balance between supply and demand, for the years 1840 to 1848 saw over-production and the wars of 1860–69 disturbed trade and introduced the second period of free markets. São Paulo had meanwhile developed its coffee cultivation. Speculation in Europe led to collection of large stocks there which weighed on the market and the liberation of the slaves in Brazil interfered with the supply of labour. Up till 1879 there was under-production, naturally followed by over-production till 1887. Then ten years of balance and again over-production till 1909. The beginning of state regulation occurred in 1903, when new plantations were forbidden for five years, extended for other five years in 1908. Higher prices for coffee were a necessity for Brazil, and the Government of São Paulo took supplies off the market for that purpose, achieving an artificial balance between supply and demand in 1909–13. The World War upset trade as the Napoleonic wars had done, and for 1919–27 there was under-production. Since then we find the Society for the Defence of Coffee in São Paulo struggling against over-production and falling prices. After the historical account comes an investigation of the demand curve and a systematic consideration of the forms of over-production and the methods of combating it. There is a full appendix of statistics. This book will be most valuable alike for those concerned in coffee as a business and for economic students.

H. W. M.

13.—*The British System of Social Insurance.* By Percy Cohen. Introduction by the Rt. Hon. Neville Chamberlain, M.P. London: Philip Allan, 1932. 8¾″ + 5½″. 278 pp. *12s. 6d.* net.

This work deals not only with the national systems of health insurance and unemployment insurance, but also with the schemes for widows', orphans' and old age pensions (contributory) and old age pensions (non-contributory), and there are two chapters on the Workmen's Compensation Act and industrial assurance (administered by insurance companies and collecting societies) respectively.

The author's method of treatment may be illustrated by reference to the first chapter, which deals with health insurance. It opens with an historical account of the inception of the scheme and of the various circumstances which led to modifications in it from time to time. This account is brought down to the end of the year 1931, and it concludes with some statistics illustrative of the magnitude of the health insurance system. Then comes a detailed description of the system, well and conveniently arranged under sub-heads such as: "Who are insured," "Who are not insured," "Contributions," "Benefits," to mention only four of the fourteen sub-heads.

In the historical part of the section dealing with unemployment insurance it is stated that the first scheme "was worked through the Labour Exchanges (as then styled) which were established under the Act of 1909, the original conception being to link up the payment of benefit with machinery for testing the genuineness of claims by the offer of employment through a national system of Exchanges," but no reference is made to the purpose for which the Labour Exchanges were set up two years before the passing of the National Insurance Act, and though such information may not be strictly germane to the subject of Mr. Cohen's book, it would have enhanced its interest had he devoted a paragraph to the history of the Exchanges.

From the chapter on workmen's compensation it might be inferred that the Employers' Liability Act, 1880, if not actually repealed by the Workmen's Compensation Act, has become a dead letter. This is not the case, however, though the number of actions taken into Court under the former Act in recent years has been small (34 in 1929 and 24 in 1930).

There are some striking figures in the chapter on industrial assurance. "In 1930 there were 17 industrial assurance companies and 151 collecting societies, possessing combined funds of £264,000,000 and covering 80,000,000 separate assurances or policies," a figure largely exceeding the combined populations of Great Britain and Ireland.

The references to Acts of Parliament and reports of committees are not as full as they might be. For example, the bald reference "Cmd. 816" is not sufficiently helpful to readers who are unfamiliar with the publications of H.M. Stationery Office. Perhaps Mr. Cohen will add a short bibliography to the next edition of his work.

This book will be of much interest to all who are interested in social questions, while employers, trade union officials, Members of Parliament and others will find in it an indispensable work of reference. In the words of Mr. Neville Chamberlain, who contributes a short introduction, "It will be found at once exhaustive, lucid and reliable."

J. W. V.

14.—*A Report on Tuberculosis, including an examination of the results of Sanatorium Treatment.* By A. Salusbury MacNalty, M.A., M.D., F.R.C.P. Ministry of Health Reports on Public Health and Medical Subjects No. 64. London: H.M.S.O., 1932. 9¾″ × 6″. viii + 172 pp. 3*s*.

Tuberculosis, as Sir George Newman points out in his prefatory note to this report, is not a disease solely of medical interest. In addition it has a wide sociological and economic significance. For instance, as a serious cause of poverty and unemployment it demands attention from the social worker; its peculiar incidence in certain industries makes the varying factory regimes of the modern state an important source of study; its tendency to be found repeatedly in the pedigrees of some families, whether from inheritance or from environment, commends it to the study of the eugenist; while, considering that the cost of maintaining residential institutions for the treatment of tuberculosis alone amounts, annually, in England and Wales to some 2½ million pounds, it scarcely allows the mere taxpayer to remain a disinterested party. It is nearly twenty years since the taxpayer became thus directly concerned, for it is nearly twenty years since anti-tuberculosis measures became an integral part of the work of county and county borough councils, the cost being defrayed out of local rates and contributions from the National Exchequer. A comprehensive survey of results both in prevention and treatment is, therefore, not out of place. It is with this object that Dr. MacNalty has prepared his report.

In the last three-quarters of a century the mortality in England and Wales from tuberculosis of all forms has declined by 72 per cent. Not only has the mortality fallen, but it has also declined in relation to the mortality from other diseases; whereas in the decade 1851–60 it was responsible for nearly one-sixth of all deaths, in 1926–29 its share was less than one-twelfth. Yet tuberculosis is still responsible for about 37,000 deaths per annum, and for the age-period between about 5 and 45 years of age it is still the chief "killing" disease. An important fact to which Dr. MacNalty draws attention is that the decline in mortality amongst young women (15 to 30 years of age) practically ceased during the early years of this century.

Although it may be true, as Sir George Newman says, that "we are witnessing and participating in the steady and gradual defeat of a widespread and devastating disease," there is obviously a long way to go yet, and we need all the information possible about the various forms of the disease. Dr. MacNalty surveys the present position and views in regard to such factors as the sources of infection, heredity, racial disposition, family infection; the conditions diminishing personal resistance, *e.g.* fatigue, malnutrition and poverty, alcohol and the association of other diseases with tuberculosis; and the external circumstances favouring infection, *e.g.* overcrowding and insufficient ventilation, special industrial causes. He gives a long and clear account of the gradual growth of the association of the State with the prevention and treatment of tuberculosis, and outlines the organization by which he thinks a systematic and comprehensive attack on the disease can best be made. The financial outlay upon the provision and maintenance of sanatoria has, in his opinion, been completely justified. Not only is it the most hopeful and favourable method, at present available, of curing pulmonary tuberculosis or of prolonging the life of the tuberculous, but by the segregation of infectious cases and by education in hygienic conduct it diminishes the risk of infection in the community. The statistical assessment of the results of sanatorium treatment is not at all easy. In it are involved such factors as the initial standards of selection and classification of patients, the problem of securing after-histories of patients for a considerable number of years, the misconception of what true sanatorium treatment implies. Dr. MacNalty gives a fair survey of the somewhat limited data available. (Since his report some additional material has been published in Norway, by Fr. Lange-Nielsen under the title Dødeligheten Blandt Sanatoriebehandlede Tuberkuløse, which includes statistics of nearly two thousand cases of pulmonary tuberculosis. English headings to the tables and an English summary are given. This report has been added to the Society's library. Many of the results do not differ materially from those reached in this country.) Dr. MacNalty concludes, as already pointed out, that with a proper selection of patients, a proper sanatorium regime and a prolonged duration of stay, the results are very favourable. On the other hand, the risk of later relapse makes after-care an essential concomitant, and the report therefore devotes attention to care organizations and village settlements. With regard to the latter a point of considerable interest is reported from the Papworth colony, viz. after fifteen years' experience "no child has while a member of the community contracted tuberculosis of the lungs, glands, bones or joints, or, indeed, in any known clinical form." In other words, this small experience suggests that the environment is a crucial factor in child tuberculosis; with adequate nutrition, proper housing and proper hygiene the risk is minimized. A special section is devoted to this subject of tuberculosis in children, and other sections deal with surgical tuberculosis, and the various methods available in the diagnosis and treatment of the different forms of the disease. It is obvious from this short summary that Dr. MacNalty is to be congratulated on having produced a survey of the present position which will be of considerable value not only to the public health worker and to the social worker, but, as Sir George Newman says, "to all those who are concerned, directly or indirectly, in improving the health and well-being of the community." A. B. H.

15.—*Papers relating to the Health and Progress of Native Populations in Certain Parts of the Empire.* Issued by the Colonial Office. H.M. Stationery Office. 1931. 9½″ × 6″. 191 pp. 3s. net.

As a nation it is to be feared we are apt to take our Colonial possessions for granted. It is probable that the majority of Englishmen have but the vaguest notions of the extent and resources of our Colonial Empire, which comprises some fifty distinct governments, whose territories extend over an area of about two million square miles—about forty times the area of England, or twice the size of British India—and whose total population of about 50 millions of people equals the combined populations of Canada, Australia, South Africa, and New Zealand.

These territories fall naturally into five main geographical groups: viz. (i) those in the Atlantic and Caribbean Sea; (ii) those in the Mediterranean and Near East; (iii) those in the Far East—stretching from the Seychelles to Hong Kong; (iv) the Pacific Islands, and (v) British Tropical Africa. Approximately eleven-twelfths of the total area, and population, of our Colonies lie wholly within the Tropics; they include units of varying size and importance in every corner of the globe, every condition of life and climate, presenting a bewildering variety of races, religions, languages, and customs. The Report under review, which is concerned with discussion of the health and progress of tropical native populations in East, West, and Central Africa, and those under the jurisdiction of the High Commissions of South Africa, Fiji, and the Western Pacific, is an intensely interesting document, providing the reader with vivid descriptions of the innumerable difficulties which face colonial medical officers engaged in endeavours to promote the physical well-being of primitive peoples, whose outlooks and standards of life differ so widely from European experience. They must not be judged by Western standards of life, and, quite clearly, attempts to impose upon such peoples in a few short years entirely new conditions and standards of living, or to introduce foreign legal and social systems, are not only misdirected efforts doomed to failure, but they will inevitably bring in their train unimagined administrative difficulties. Yet there are people who hastily generalize from disturbing rumours, or from very limited experience of one or two areas, and demand the most sweeping changes which, if introduced, would undermine the foundations of really admirable tribal institutions, with their complex ramifications touching such matters as personal status, relationship, inheritance, and so on. They forget that if these are destroyed, others must be found to replace the functions which those tribal institutions now discharge with considerable efficiency.

It is true that some native customs are directly repugnant to European ideas of hygiene and medical knowledge—yet, as this Report points out, there are many races and tribes that observe a higher standard of cleanliness than that to be met with amid the squalid surroundings of many great European cities; many native peoples clean their teeth after every meal, yet there are millions of Europeans who have never used a tooth-brush. Female "slavery," so whole-heartedly condemned by some well-meaning people labour-ing under complete misconceptions of the significance of "bride-price" among native people, is discussed impartially and in considerable detail. The custom has not the remotest relation to slave marriage by purchase, but is instead an integral part of an elaborate and binding marriage ceremony under tribal laws, and a guarantee of proper treatment of a wife. The inheritance by a surviving son of his deceased father's wives does not, as is so often supposed, postulate a state of servitude or immorality, for such wives are "tabu" to the son; on the contrary, this is a merciful provision ensuring that widows shall not be left to starve. Misinformed critics have heatedly demanded the abolition of the initiatory ceremonies associated with the puberal period of native youths and maidens on the grounds that the rites involve intense physical suffering, mutilation, or injury; or the view seems to be that because such rites are pagan they must of necessity be bad. Yet, the Report avers, the most searching enquiries by medical and administrative officers have failed to discover dependable evidence, either medical or statistical, in support of the view that the simple operations involved are harmful, that evil results follow these practices, or that candidates attempt to avoid the rites, which carry with them the weight of immemorial tradition and the sanctity attaching to a religious observance. On the other hand, it would appear that the solemn ceremonies of initiation into the rights and duties of manhood and womanhood might be, and frequently are, turned to the greatest influence for good; attempts to prohibit their practice by law would arouse a storm of indignation as great as would follow attempts in England to prohibit the use of the wedding-ring in the marriage ceremony.

In the midst of this bewildering welter of superstitions, beliefs, and prejudices, medical and administrative officers throughout the Colonies carry on their work, attempting to extend the frontiers of civilization, slowly accumulating particularized knowledge of the curious customs of the people among whom they work, endeavouring to purge native systems of their abuses. By educational and other means they seek to graft a higher civilization upon the soundly rooted native stock which has its foundations in the hearts, minds, and thoughts of the people, instead of trying to subdue or extinguish their force and spirit, and trying to introduce an alien system. Reporting officers emphasize the fact that many of these people are but a few generations removed from their head-hunting or cannibal ancestors, and that the customs originating from that state of life are still in large measure followed. Colonial officers realize these difficulties; they are faced with a complex variety of special characteristics of physique, tradition, customs, and so on, among people ranging from the extremely primitive to the semi-civilized, and experience tells them that measures designed for the abolition of objectionable practices, or the amelioration of unhealthful conditions, can be introduced only by the exercise of great caution and tact, and by securing the sympathy and co-operation of the natives themselves.

Other and equally interesting subjects discussed have reference to such matters as the numbers of the population and the general level of their physique; the steps taken for the promotion of health, and the creation of better developed stock; the prevalence and influence of various native customs; the training of native women in maternity work, the promotion of infant and child welfare and the establishment of suitable centres for such purposes. Indeed, the Report is of such compelling interest that its publication should be given the very widest publicity. P. G. E.

16.—*Other New Publications.**

Antonucci (*A.*). Repartition et Reglement de la Dette Publique Autrichienne et Hongroise d'avant-guerre. 9″ × 5½.″ 340 pp. Paris: Marcel Giard, 1932. 50 *fr.*

[A detailed historical and documentary account of the proceedings of the Reparation Commission in carrying out the distribution of the pre-War Austrian and Hungarian Public Debt, and the settlement of the Debt so distributed. The author was Director of the Financial Section of the Reparations Commission, and was instructed by the Commission, on the conclusion of its labours in April 1931, to draw up a general report thereon. Two reports were issued, in 1925 and 1926, as Vols. VII and XIII of the Commission's Publications, but the subsequent proceedings did not follow the lines they indicated, and the present work not only completes the record, but to a large extent supersedes the earlier volumes.]

California University Publications in Economics. Vol. 5, Nos. 4 and 5. Cost of Living Studies, III and IV. 11″ × 7″. Berkeley, California, 1931.

[These studies are issued under the direction of the Heller Committee for Research in Economics of the University. No. III deals with the food budgets of twelve families of the professional class. The sample is even less adequate than the numbers would suggest, since nine of the twelve families were connected with the University, seven of them had no children and there were only six children among the rest. It is nevertheless claimed that the food selected for the budgets is fairly representative of that consumed by Americans of the same social class. The calculations are based on the quantities of food purchased, not consumed, during a month, and the weights of the food have been computed according to local prices. The cost and choice of foods and their nutritive values are discussed in later chapters. There are numerous tables. No. IV examines the income and expenses of ninety-eight street carmen's families in a district of San Francisco; they are regarded as a semi-skilled group, occupying a middle position between skilled and unskilled workers. Their yearly wages and other earnings averaged from 1,600 to 2,000 dollars, their average length of service was between seven and eight years, and their average age thirty-nine years. They were all married except two, and had among them 231 children, the majority of whom were entirely dependent on their parents for support. The mean expenditures on food, housing, clothing, and lesser items, are given. It was considered that the families as a rule had enough to eat and were comfortably housed. Many, however, needed medical and dental attention which they could not afford to pay for and were too independent to seek at free clinics.]

Graham (*A. C.*) and *Lategan* (*P. N.*). The Coals of the Witbank District (Transvaal). 8¼″ × 5¾″. viii + 169 pp. Charts, Plans, etc. Johannesburg: Transvaal Chamber of Mines, 1931.

[An interesting account of the Witbank coalfield, in two parts. Mr. Graham, the author of the first part, gives a short geological survey of the coalfields of South Africa with special reference to the Witbank field, which, owing to the high quality of its coal and its proximity to the gold mines, has become the chief source of coal in South Africa. The methods of mining, labour conditions, as regards both white and native workers, and the marketing of the coal are briefly surveyed. In the second part Dr. Latigan deals with the physical and chemical properties of the coal, discusses the future possibilities of oil extraction, and emphasizes the necessity for further coal and fuel research.]

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* *See also* "Additions to Library," p. 599.

Hersch (*Liebmann*). International Migration of the Jews. [From International Migrations, Vol. II. Interpretations. National Bureau of Economic Research, New York, 1931.] 8¾″ × 5¾″. pp. 471 + 520.

[The special character of the material treated in the 16th chapter of *International Migrations* (reviewed in Part I of this year's *Journal*) appears to justify its reprinting as a separate pamphlet. The limitations of the data restrict the study to international migration of the last half-century, and necessitate its being based mainly on the immigrant records of the United States, which in any case cover more than three-quarters of all Jewish international migrants. The figures show that from 1899 to 1924, 1,800,000 Jews entered the United States, 1,500,000 of them in 1899–1914; they constituted 9·5 per cent. of the total immigrants and at least three-quarters of the number came from Russia or Poland. The Jews are distinguished from the other European immigrants by the small proportion repatriated (only 1·5 per cent. of the total emigrants from the United States are Jews), by the large proportion of unoccupied persons, *i.e.* women and children, and by the high percentage of skilled workers among the occupied. Two-thirds of the workers are industrial and 60 per cent. of these are employed in the clothing industry. New York to-day contains about two million Jews. The statistics relating to Canada, Argentina, and South Africa are also analyzed and are followed by a brief but illuminating account of the post-War immigration into Palestine. In the concluding pages the author summarizes the causes and effects of modern Jewish migrations. The former are related to the occupational peculiarities of the group, and one of the main effects has been to transform the Jews from a village and small towns-folk into city-dwellers, to break up their traditions, to scatter them more widely over the world, and to make any prospect of a Jewish national home recede further from probability.]

Lasorsa (*Giovanni*). La Statistica dei Salari Industriali in Italia (Scuola di Scienze Politiche e Sociali della R. Università di Padova). 10″ × 7″. 97 pp. Milano: Cedam. 1931. *L.* 15.

[This very careful and elaborate study is an investigation of the position of workers in selected groups with respect to the money rates of wages and to the fluctuations of real wages in Italy during the last decade. Chapter I discusses the composition of workers' budgets to be used in calculating real wages and the question of a subsistence minimum. The succeeding chapters discuss the sources of information and the methods used by the author in ascertaining the actual rates paid, and give tables relating to workers in the principal industries—woollen, silk, metallurgical, mechanical, and paper-making—and those employed on public works, and, finally, comparative figures of the wages paid in the chief industrial centres. Many diagrams are included. The author has avoided the formulation of theories and the drawing of conclusions; his purpose was to establish the facts which are required to provide a basis for action.]

Lewis (*Edward E.*). The Mobility of the Negro. 9″ × 6″. 144 pp. New York: Columbia University Press; London: P. S. King & Son, Ltd. 1931. 9*s.*

[This is the third volume of a series of studies relating to negro migration made under grants by the Social Science Research Council and the

Columbia University Council for Research in the Social Sciences. It consists for the most part of an elaborate analysis of figures taken from the United States Census of Agriculture, showing changes in the numbers of white and coloured farmers, respectively, in various districts in the Cotton Belt in the year 1929 as compared with 1924, in order to determine whether the migration of negroes to the northern states in the period 1924–29 was due mainly to depression in the cotton-growing area or to the attraction of industries in the north. The conclusion reached is that, on the whole, " the intensity of the demand for industrial labour was so great as to make it the predominant factor in the movement of the Negro."]

Schoolmeesters (*Herman*). Les Lois sociales et la Production. 8½ × 5½. 18 pp. Paris: Marcel Giard [1931].

[The author, who is a doctor of law as well as of economic and administrative science, makes a general indictment of the principle of State interference with the rewards of labour and enterprise, and a particular condemnation of the social laws which have been passed in Belgium since the War. In his view, the effects of these in reducing hours, raising wages, instituting compulsory insurance with contributions from employers and taxpayers, are mainly responsible for the depressed condition of the country; nor are the effects confined to industry, since the high wages paid to urban workers have drawn away large numbers from the land and agricultural wages have consequently risen while production has decreased. Dr. Schoolmeesters's summary of the case (p. 17) begins " O legislators responsible for this, behold your work."]

Thirring (*Louis*). Esquisse de l'Accroissement de la Population de la Hongrie d'avant et d'après la Guerre et quelques propriétés Caracteristiques des Fluctuations du Nombre des Habitants. 9″ × 6″. 48 pp. Budapest, 1931.

[This is the reprint of a paper which appeared in the *Journal de la Société Hongroise de Statistique*, Année 1931, Nos. 2–3. The population statistics of Hungary and its component parts are elaborately set out and minutely analyzed, with the particular aim of comparing the movements of population in the territory composing the present Hungary with that of the populations excluded after the War by the term of the Treaty of Trianon, and of making it clear that the new frontiers, by depriving Hungary proper of the greater part of her economic resources, arrested the development of her population, which the figures show to have been the most vigorous section of the peoples occupying the former territory.]

CURRENT NOTES.

On another page we give our usual table summarizing the overseas trade of the United Kingdom for the years ended June 30th, 1931 and 1932. The value of the goods imported during the first quarter of this year was £16·4 million, or 7·8 per cent.. less than in the corresponding quarter of 1931, but for the second quarter the reduction in value was £41·5 million or 19·9 per cent. Corresponding figures for exports of United Kingdom goods were £11·0 million or 10·7 per cent. for the first quarter and £1·1 million or 1·2 per cent. for the second. Making a comparison between the figures for the two quarters of this year, imports declined in the second quarter by £26·8 million, while British exports increased by £2·4 million. There was, however, a reduction from £16·1 million in the first quarter to £13·2 million last quarter in the exports of imported merchandise. The latter decrease is doubtless due in part from the restrictive effect on imports resulting from the new duties, but is also due to a considerable extent to the increased transhipment of goods under bond, such goods not being recorded among the imports and re-exports. The total value of goods so transhipped has been given in the monthly "Accounts relating to Trade and Navigation" commencing with the March issue, and it appears that for the first quarter of this year the value of such goods was the same as a year earlier, viz. £4·9 million, and that in the second quarter the value increased to £5·4 million, whereas in 1931 there was a decrease to £4·4 million.

The excess of imports over exports of merchandise during the first half of this year was £143·6 million, being a reduction of £39·4 million compared with the corresponding period of last year. During the first quarter of the year the excess was reduced only by £4·2 million, but during April, May and June, the adverse balance was reduced by £16·8 million, £8·9 million and £9·5 million, respectively. As indicated above, this relative improvement in the merchandise balance, especially during the second quarter of the year, was due primarily to a reduction in imports, though the value of exports was more in the second quarter than in the first and was nearly as much as in the second quarter of last year, notwithstanding the price fall during the intervening twelve months.

The changes in the make up of the import totals are of importance, the figures being as follows:—

Increase (+) or Decrease (—) in Value of Retained Imports during 1932 compared with 1931.

	Food, Drink and Tobacco.	Raw Materials.	Manufactured Articles.	Total.
		In million £		
January . . .	(—) 4·8	(—) 0·7	(—) 6·6	(—) 12·5
February	(+) 3·8	(+) 2·1	(+) 0·8	(+) 6·9
March	(—) 1·3	(+) 1·2	(—) 9·2	(—) 9·5
April	(—) 4·4	(—) 1·3	(—) 8·4	(—) 14·5
May	(—) 2·8	(—) 0·6	(—) 8·9	(—) 12·5
June	(—) 1·4	(+) 0·1	(—) 7·8	(—) 9·2
Total, Jan. to June..	(—) 11·1	(+) 0·9	(—) 40·2	(—) 51·5

The table indicates clearly the course of our import trade during this year as compared with last. The forestalling of the new import duties, which came into force on March 1st, is evident from the February figures which show increases for each of the three principal classes. The Orders made under the Abnormal Importations (Customs Duties) Act, imposing 50 per cent. ad valorem duties on a wide range of manufactured articles, reduced the value of the imports of manufactured articles in January, and those Orders, coupled with the general 10 per cent. duty, reduced the value yet further in March and April, while in the May and June figures we may trace the effect of the 33⅓ per cent. duty on iron and steel goods and of the other duties imposed as a result of the recommendations of the Tariff Advisory Committee.

The increase in the value of the retained imports of raw materials may be regarded as a hopeful sign from the point of view of the prospects of British industry, though it may be noted that the increase in value was wholly in the first quarter, the second quarter showing a decrease of between 5 and 6 per cent. Comparing the second quarter of this year with the corresponding period of 1931, retained imports of raw cotton showed an increase of 72·1 million lbs. (35 per cent.) following an increase of 61·1 million lbs. during the first quarter of the year, while the imports of raw sheep's and lambs' wool increased by less than 1 per cent. Imports of raw silk and of silk cocoons, waste, etc., showed substantial increases. but of the other textile raw materials, hemp and jute showed declines, imports of jute being reduced by more than two-thirds, while flax showed a slight increase. Retained imports of phosphate of lime, iron pyrites, soft wood, pit props, palm kernels, wet hides and wood pulp were substantially higher than in the second quarter of last year, but imports of iron ore, copper ore, ground nuts, coconut oil and rubber showed a marked reduction.

Retained imports of grain and flour were about 8 per cent. greater last quarter than a year earlier, due mainly to an increase of 3·4 million cwts. (14 per cent.) in the imports of wheat and a somewhat smaller proportionate increase in those of maize. These increases were similar to the movement recorded for the first quarter of the year, as also was a decrease in the imports of barley. The total quantity of meat imported this year was about the same as in 1931, there being an increase of 2 per cent. for the first quarter, and a corresponding decrease for the second quarter in which there was a substantial increase in imports of mutton and lamb and a decline of 14 per cent. in imports of beef. Imports of butter and cheese were about the same as in the second quarter of 1931, while imports of tea increased by about 30 per cent. and of raw sugar by 18 per cent.

In the first quarter of the year the largest decreases in values among the groups of manufactured articles imported were recorded in the three groups most affected by the Abnormal Importations Orders, viz. apparel (£3,221,000), woollen and worsted yarns and manufactures (£2,681,000) and cotton yarns and manufactures (£1,749,000). These groups also showed very large declines in the second quarter, viz. £3,167,000, £2,635,000 and £1,696,000, respectively; the similarity of these figures to those for the previous quarter would seem to indicate that as regards these groups there is little difference between the restrictive effect of the new duties and of the Abnormal Importations duties, which were higher but not so general as those now in force. For the second quarter there are three other groups in which there was a decline exceeding £2,000,000, viz. miscellaneous manufactured articles (£3,432,000), non-ferrous metals and manufactures thereof (£2,906,000)—all the semi-manufactured materials as well as the finished products showing heavy declines—and iron and steel and manufactures thereof (£2,561,000). Retained imports of iron and steel declined from 665,000 tons to 414,000 tons, the decrease, while affecting all classes, being relatively greatest in respect of finished iron and steel goods. All the other groups showed substantial decreases in value except the manufactured oils group, in which there was an increase of £657,000 due to the retained imports of refined petroleum increasing by about 41 million gallons (9 per cent.).

As regards domestic exports, the quantity of coal exported last quarter was 10,351,000 tons, or about 5 per cent. less than a year earlier; for the first quarter of the year the decline was 9 per cent., and the above figure is the smallest percentage fall recorded for any quarter since the first quarter of 1930. Canada, Brazil and the Scandinavian countries all took substantially increased quantities, but exports to other principal markets on the Continent were largely reduced mainly owing to quota restrictions, exports to Germany, for example, being reduced from 949,000 tons to 499,000 tons. Exports of iron and steel goods as a whole decreased by about 8 per cent., the decline for the first quarter being under 2 per cent., but the exports last quarter were slightly more than in the first quarter of the year. As for the first quarter, there was a considerable decline last quarter in the exports of railway material and substantial increases in the exports of galvanized sheets and tinned plates. Exports of machinery, which for the first quarter declined by 6 per cent. compared with a year earlier, increased last quarter by over 2 per cent., there being increased exports of textile and electrical machinery, machine tools, and sugar making and refining machinery. Exports of motor-cars and chassis increased in number from 5,469 to 8,966, but exports of motor-cycles and other cycles were appreciably less than a year ago. As for the first quarter, exports of locomotives and of new ships and boats were much less than in 1931.

The improvement in the cotton trade as compared with last year was very marked in the second quarter as in the first, and for the second quarter there were increased exports of each description of cotton goods. Exports of yarns increased by 18 per cent. and of piece goods by 43 per cent., the latter being largely due to a 50 per cent. increase in exports to India, but most of the principal markets for piece goods except Switzerland showed increases. The quantity of each of the other principal descriptions of textiles exported was also greater than in the second quarter of 1931, exports of wool tops increasing by 23 per cent., woollen and worsted yarns by 10 per cent., woollen and worsted tissues by 12 per cent., woollen carpets by 52 per cent., artificial silk tissues by 37 per cent., linen piece goods by 13 per cent., and cordage by 19 per cent., to mention some of the more important increases. The increase in the value of cotton goods exported was £3,177,000, of woollen and worsted goods £280,000, of silk goods £33,000 and of manufactures of other textile materials, £360,000. Exports of apparel were the same in value as in the second quarter of last year, but the quantities of nearly all descriptions of apparel exported, including hats, boots and shoes, stockings and hose, showed increases, that in respect of stockings and hose, whether of cotton, wool, or artificial silk, being substantial.

For the first quarter of the year only two groups, cotton goods and paper and cardboard, showed increases in value compared with the corresponding quarter of 1931, but for the second quarter there were, apart from the increases already mentioned, increased exports of paper and cardboard (£229,000), mainly newsprint; chemicals, drugs, etc. (£225,000), chiefly sodium compounds, though many descriptions showed increases; cutlery, hardware, etc. (£158,000), with substantial increases in cutlery and implements and tools; and non-ferrous metals and manufactures thereof (£115,000), principally tin and aluminium, but most descriptions showed increased quantities, though not increased values. Among other goods, exports of gramophone records showed some increase, while the quantity of leather exported was about the same as last year.

Movements of bullion and specie were very heavy during both the first and the second quarters of the year, but whereas for the first quarter exports exceeded imports by £4,292,000, in the second quarter imports amounted to £20,114,000 more than exports. The great bulk of the exports continued to go to France, while India remained a main source of supply of imports. Reference has been made above to the reduction in the adverse balance on merchandise account this year as compared with last, and taking the twelve months ended June, there was a decrease as compared with the preceding twelve months from £381,785,000 to £369,626,000. If imports and exports of bullion and specie be added to those figures, the excess of imports over exports shows a decrease from £387,936,000 to £339,241,000.

Movements and Classes.	Twelve Months ended June, 1931.	Twelve Months ended June, 1932.	Increase (+) or Decrease (−).
Imports, c.i.f.—	£'000.	£'000.	£'000.
Food, drink, and tobacco	438,786	403,869	− 34,917
Raw materials and articles mainly unmanufactured	198,372	172,450	− 25,922
Articles wholly or mainly manufactured ...	272,127	219,320	− 52,807
Other articles	10,824	8,685	− 2,139
Total Imports ...	920,109	804,324	−115,785

Movements and Classes.	Twelve Months ended June, 1931	Twelve Months ended June, 1932.	Increase (+) or Decrease (−).
Exports, f.o.b.—			
United Kingdom Produce and Manufactures—	£'000.	£'000.	£'000
Food, drink, and tobacco	42,993	33,793	− 9,200
Raw materials and articles mainly unmanufactured	52,967	45,109	− 7,858
Articles wholly or mainly manufactured ...	351,791	283,185	− 68,606
Other articles	17,309	14,954	− 2,355
Imported Merchandise—			
Food, drink, and tobacco	22,066	18,169	− 3,897
Raw materials and articles mainly unmanufactured	30,242	23,982	− 6,260
Articles wholly or mainly manufactured	20,192	15,036	− 5,156
Other articles	764	470	− 294
Total Exports ...	538,324	434,698	−103,626
Bullion and Specie—			
Imports	90,248	149,822	+ 59,574
Exports	84,097	180,207	+ 96,110

Movements of Shipping in the Foreign Trade—	Number of Vessels.	Thousand Net Tons.	Number of Vessels.	Thousand Net Tons.	Number of Vessels.	Thousand Net Tons.
Entered with cargoes—						
British	29,832	39,502	27,517	37,357	−2,315	−2,145
Foreign	25,255	22,289	25,139	21,616	− 116	− 673
Total entered ...	55,087	61,791	52,656	58,973	−2,431	−2,818
Cleared with cargoes—						
British	37,083	40,026	34,680	36,853	−2,403	−3,173
Foreign	20,872	21,525	19,272	19,409	−1,600	−2,116
Total cleared ...	57,955	61,551	53,952	56,262	−4,003	−5,289

The general trend of *wholesale prices*, which showed little change on the whole during January and February, was in a distinctly downward direction during the succeeding three months. As measured by the Board of Trade index-number of prices a fall of 4·3 per cent. on balance is indicated, the index-number for May, 1932 (1930 = 100) being 84·3, as compared with 88·1 for February, and 87·6 and 85·7 for March and April respectively. Prices were still 3·5 per cent. below the level of May, 1931 when the index-number stood at 87·4, and indeed are only 2·5 per cent. in advance of the prices ruling in the period (Sept. 1–19, 1931) immediately preceding the date when the gold standard ceased to govern currency issues. The only group which showed a tendency in the opposite direction was that for articles of meat and fish, the index-number for which (78·0) was 4·1 per cent. in advance of that for February, 1932. Part of this increase is due to the temporary advances in bacon prices following on the dispute in the Danish bacon-curing industry, but there has also been a fairly steady rise in beef prices amounting in the case of some qualities imported to between 20 and 30 per cent. The price of tea has also advanced considerably during the three months, the average price of Indian tea at London auctions in May showing an increase (exclusive of the reimposed duty) of nearly 18 per cent. compared with February. The group index-numbers on the three bases used by the Board of Trade are given below for the three months March to May, 1932.

Base Year.	Month.	Food	Not Food.	Total.
1930 = 100	March 1932	91·3	85·7	87·6
	April 1932	90·9	83·0	85·7
	May 1932	90·3	81·2	84·3
1924 = 100	March 1932	69·5	59·6	63·0
	April 1932	69·2	57·8	61·6
	May 1932	68·8	56·5	60·6
1913 = 100	March 1932	115·6	98·9	104·6
	April 1932	115·1	95·8	102·4
	May 1932	114·4	93·8	100·7

The *Economist* index-number (1927 = 100), which at March 9, 1932 stood at 66·3, had fallen by June 1 to 60·5 or 8·7 per cent., chiefly due to decreases of 15·6 per cent. in the textile group and 13·8 per cent. in the group containing articles of food other than meat and cereals. There were decreases, though not so considerable, in the other groups constituting the index. The *Economist's* general price level at June 1, 1932 was still nearly 5 per cent. below the level of May, 1931.

As measured by the *Statist* index-number there was a fall in general prices over the three months March to May, 1932 of 7½ per cent. The fall was least in the group relating to animal foods (less than 1 per cent.) and greatest among textiles (15·2 per cent.). The index-numbers at the end of the three months March, April and May, 1932, were 84·1, 82·5 and 80·2, respectively, and was 82·2 at the end of May 1931.

The general change in prices in the United Kingdom since the end of August, 1931, compared with the changes in the gold standard countries is given below.

Average of 1913 = 100.

	Board of Trade.	*Economist.*	*Statist.*	U.S.A. (Bradstreets).	France (*Stat. Gen.*).	Germany (*Stat. Reichsamt.*).
August, 1931 ...	99·5	85·7	93·1	92·2	455	110·2
May, 1932	100·7	85·3	94·4	72·5	421	97·7

There was a noticeable rise in *shipping freights* in March, 1932, amounting on balance to rather more than 5 per cent., but though in April there was little change on the whole, decreased rates in May brought the index-number compiled by the Chamber of Shipping to within one per cent. of the figure at which it stood in February, 1932. The index-numbers (1920 = 100) for the three months March, April and May, 1932, were 20·4, 20·3 and 19·4 respectively.

According to the latest returns to Lloyd's Register, about 13,000,000 tons of shipping and (gross tonnage), or 19 per cent. of the world's tonnage, are laid up for economic reasons at home ports. The United States have 3,200,000 tons, or 24 per cent. of the total owned in that country, the United Kingdom 2,750,000 tons (14 per cent.), Germany 1,300,000 tons (31 per cent.) and France 1,000,000 tons (28 per cent.).

According to the monthly valuation of *Stock Exchange Securities* measured by the *Bankers' Magazine* index-number there was a marked improvement in Fixed Interest Stocks, the number rising from 106·5 in February to 111·4 at May 20, 1932. Prices of Variable Dividend Securities, however, dropped during the same period as much as 10·6 per cent., the index-number falling from 91·7 to 82·0. The index-numbers for certain months are given below, that for September, 1931, relating to a date immediately preceding the "crisis."

	Fixed Interest Stocks	Variable Dividend Securities.	Total.
September, 1931	103·5	89·5	99·0
March, 1932	111·6	92·7	105·5
April, 1932	110·6	84·5	102·1
May, 1932	111·4	82·0	101·8

According to the Ministry of Labour index-number of retail prices of articles of working-class consumption, there has been a continued decline, on balance, in food prices since March 1, 1932 and at June 1, 1932 they were only 23 per cent. above the level of July, 1914. At June 1, 1931 and Sept. 1, 1931 food prices were 27 and 28 per cent. respectively above that level. The index-number for all items (food, rent, clothing, fuel, etc.), which at Sept. 1, 1931 was at 145 and had risen to 148 at December 1, has now fallen to 142, a decline due entirely to the reductions in food prices.

Index-numbers (July 1914 = 100).

	Sept. 1, 1931.	Dec 1, 1931.	April 1, 1932.	May 1, 1932	June 1, 1932.
Food Prices	128	132	126	125	123
All items (food, clothing, rent, fuel, etc.)	145	148	144	143	142
All items (a year earlier) ...	157	155	147	147	145

The returns relating to *retail sales* prepared by the Incorporated Association of Retail Distributors and the Bank of England, and published in the *Board of Trade Journal*, continue to show each month a decline compared with the corresponding month in 1931. During the four months February to May, 1932 sales of food and perishables declined 4·1 per cent. and sales of other kinds of merchandise 5·6 per cent. There is not any great variation in the decline as between the several districts, but it is least in the South of England (3·6 per cent.) and greatest in the sales of boots and shoes (10·4 per cent.), piece-goods (8·9 per cent.) and "men's and boy's wear" (8·0 per cent.). The numbers employed showed a fall of 0·5 per cent. in May as compared with May, 1931, and stocks at the end of that month a fall of 3·5 per cent.

The following table gives for the principal countries the percentage increases on July, 1931, and on the latest available date of the retail prices of food and other articles compared with the prices at July, 1914:—

Country.	Retail Prices of Food at		Retail Prices of All Items at		Date of Latest Return.
	July, 1931.	Latest date available.	July, 1931.	Latest date available.	
	Per cent	Per cent.	Per cent	Per cent.	
Great Britain	30	23	47	42	June 1
Overseas Dominions.					
Australia	25	27	25 †	23 §	April
Canada	10	– 2	37	31	,,
Irish Free State	43 *	51	25	23	February
New Zealand	18	13	45	39	April
South Africa	4	– 1	22	19	,,
Foreign Countries.					
Belgium	—	—	689	615	,,
Czechoslovakia	18	6	4	2	,,
Denmark	19	15	54	55	,,
Egypt (Cairo)	—	—	34	34	March
Finland	718	757	904	910	April
France (Paris)	517	459	465	434 (1st qr., 1932)	May
Germany	30	13	37	21	,,
Holland (Amsterdam) ...	—	—	54 ‡	41	March
Italy	342	334	—	282 (July–Dec.) 1931	,,
Norway	40	34	52	50	April
Spain (Madrid)	93	97	—	—	,,
Sweden	30	26	58	57	May
Switzerland	40	28	50	40	April
United States	17	2	50 ‡	46 (Dec. 1931)	,,

* Figure for August. † 3rd quarter, 1931.
‡ Figure for June. § 4th quarter, 1931.

Unemployment at the end of May, 1932, was on the whole about the same as at end of February and rather worse than at December 21, 1931. The proportion unemployed in the insured industries in Great Britain, which was 21·9 per cent. at the end of February, dropped to 20·8 per cent. in March, but in the two following months it increased to 21·3 per cent. and 22·0 per cent. for April and May respectively. At the end of May, 1931 the proportion unemployed was 20·6 per cent. The returns for the month of May relate to the Monday following Whit-week, and in a year of bad employment it is possible that the figures may be adversely influenced by extended Whitsun holidays, but, on the other hand, the recent administrative changes have caused, according to the Ministry of Labour *Gazette*, a reduction of approximately 155,000 in the number of insured persons recorded as unemployed. It is not certain, of course, that the entire 155,000 could at the end of May, or indeed at any time, have been legitimately recorded as involuntarily unemployed. It seems clear, however, that unemployment has been appreciably worse during the first five months of 1932 than in the corresponding period of 1931. The monthly figures issued by the Ministry of Labour showing the numbers on the registers of Employment Exchanges are given below :—

Date.	Wholly Unemployed.	Temporarily Stopped.	Persons normally in Casual Employment.	Total.
Dec. 21, 1931 ...	2,002,464	403,432	104,025	2,509,921
Jan. 25, 1932 ...	2,131,298	496,298	100,705	2,728,411
Feb. 22, 1932 ...	2,112,927	486,599	101,647	2,701,173
March 21, 1932 ...	2,042,444	422,676	102,212	2,567,332
April 25, 1932 ...	2,031,888	516,563	103,730	2,652,181
May 23, 1932 ...	2,001,127	630,664	109,515	2,741,306
June 1, 1931 ...	*1,844,945*	*668,873*	*116,153*	*2,629,971*

The only important group of industries which is distinctly better employed than a year ago is that of textiles, although there has been some slackening in activity during April and May. The statistics of unemployment in these industries may, however, be more affected than those in other industries by the changes in the administration of unemployment insurance by reason of the large numbers of females usually employed therein.

Unemployment in Germany, which had increased during January and February, 1932 showed a continuous slight improvement during the three following months. According to official German sources the number *available for and seeking work* fell from 6,209,000 at the end of February to 5,693,000 at the end of May, or nearly 516,000. The number definitely recorded as unemployed had fallen over the same period from 6,128,000 to 5,583,000, or nearly 546,000. At the end of May 2,658,000 were in receipt of either standard or emergency unemployment benefit as compared with 3,525,000 at the end of February, 1932.

Returns from German trade unions covering about 4,000,000 members showed also a decline in the proportion unemployed from 44·1 per cent. at the end of February to 43·9 per cent. at the end of May. The proportion on short time, however, showed very little improvement, being 22·6 per cent. and 22·1 per cent. respectively at the two dates named.

In France there appears to have been very little improvement in employment. The monthly special investigation covering industrial and commercial undertakings employing at least 100 workers (including mining and transport) continues to show a decline as compared with a year ago of from 14 to 15 per cent. in the numbers employed. The numbers on short time continues at over 50 per cent., the proportion at the beginning of May being 51·67 per cent., of which 36·61 per cent. worked 40 hours or less and 15·06 per cent. between 40 and 48 hours. The number on the Registers of Employments Exchanges (an incomplete index of unemployment) was 318,833 at the end of May and 332,958 at the end of February.

In Belgium, out of about three-quarters of a million members of unemployment insurance societies, 21·3 per cent. were unemployed at the end of February, 1932 (the date of the latest published return), and in addition 22·8 were intermittently employed during February, in which month 25·4 per cent. of the aggregate working days were lost through unemployment.

In Denmark unemployment increased during the first three months of 1932, rising (according to returns from the Central Employment Exchange and Unemployment Insurance Funds), from 32·2 per cent. at the end of December, 1931 to 35·8 per cent. at the end of March, 1932. The proportion out of work dropped, however, at the end of April to 29·9 per cent. In Sweden, unemployment, according to trade union returns, improved slightly from January to April, at the end of which month 20·5 per cent. of the trade unionists were out of work as compared with 24·2 per cent. at the end of January. In Norway no improvement had appeared at the end of March, when 25·4 per cent. of trade unionists were reported out of work.

In Italy, employment has showed little change since the beginning of the year, when statistics of the National Social Insurance Fund recorded 1,051,321 as unemployed. This number increased to 1,147,945 at the end of February, but by the end of April it had fallen to 1,000,025. The number recorded as out of work in April, 1931 was 670,353.

There has been no improvement in the unemployment situation in the United States, and the index-number of employment in manufacturing industries—based on returns from establishments employing nearly 3,000,000 work-people—had fallen in April to 62·2 (1926 = 100). This is the lowest point recorded. According to other returns received by the Federal Bureau of Labour from establishments employing about 4,500,000 work-people in April there was a fall in employment in the month of 2·7 per cent. and a reduction in aggregate earnings of 5·1 per cent. With three trifling exceptions there has been a fall in employment each month since September, 1929, and there seems no signs of its cessation. The American Federation of

Labour reported that at the beginning of May in 24 cities of the United States 31 per cent. of their members were out of work.

In Canada there have been some signs of improvement since the beginning of the year, but they are almost entirely seasonal. The index-number of employment (1926 = 100) fell from 91·6 at the beginning of January, 1932 to 87·5 at the beginning of May. At the beginning of May, 1931 the index-number stood at 102·2.

Apart from some slight decreases in unemployment since the beginning of 1932 as recorded by the registers of employment exchanges in Austria, Poland and Czechoslovakia, there seems no signs anywhere of a quickening of industrial activity.

The average price of agricultural produce in England and Wales has shown a further small decline during the past quarter, and in June the Ministry of Agriculture's monthly index number stood at 111 (1911–13 = 100), the lowest figure recorded since the war. This represents a drop of 10 per cent. as compared with the corresponding month of 1931 and of 23 per cent. as compared with the same period in 1927–29. The decline is chiefly noticeable in the case of sheep and pigs, both being affected by large home supplies and by imports of dead meat (frozen lamb and bacon). Milk is also cheaper and there has been a sharp drop in wool. British wheat shows little alteration, but world wheat prices have been declining recently, though they remain on a higher level than a year ago: the Liverpool July future, for example, stood at 4*s.* 9*d.* per cental in the middle of July as against 3*s.* 10*d.* at the same date in 1931. Exceptionally low prices have been recorded in America, the Chicago July future being down to 46 cents per bushel, which is nearly if not quite the minimum recorded for many years.

Feeding-stuffs became somewhat cheaper during the past quarter, but in June prices were nearly 15 per cent. higher than in the same month last year. Fertilizers showed no change at 9 per cent. below the pre-war base.

The monthly index-numbers published by the Ministry of Agriculture are given below for the past three months with comparative figures for 1931 (1911–13 = 100).

	April.		May.		June.	
	1931.	1932.	1931.	1932.	1931.	1932.
Produce	123	117	122	115	123	111
Feeding-stuffs ...	88	99	87	97	82	94
Fertilizers	100	91	100	91	100	91

Dr. W. A. Shewhart, a member of the technical staff, Bell Telephone Laboratories, New York, gave a course of three lectures on "The Rôle of Statistical Method in Industrial Standardization" at University College, London, on 3rd, 5th and 6th May, 1932. The theatre was overcrowded and the lectures were received with great enthusiasm. The first lecture dealt with the economic control of quality of manufactured product. It was indicated how statistical theory might be used in the establishment of a scientific basis for determining when we have gone as far as it is economically feasible to go in eliminating unknown or chance causes of variability in the quality of product. The second lecture dealt with random sampling from an engineering point of view, and outlined the rôle of the theory of random sampling in helping the engineer to plan rational sampling procedures, to determine the proper sample size and to make the most efficient use of engineering data. The third lecture dealt with economic standards of quality and illustrated the application of statistical theory (*a*) in the specification of the aimed-at quality characteristics so as to be of greatest usefulness from the point of view of design, production, and inspection; (*b*) in the establishment of efficient sampling procedures to attain adequate assurance that the quality specified was, in fact, being attained under the manufactured conditions.

A full development of this subject is given in Dr. Shewhart's recently published book *The Economic Control of the Quality of the Manufactured Product*, which is reviewed elsewhere in this issue.

Following these lectures, a conference of representatives of science and industry was held at the British Standards Institution, 28 Victoria Street, S.W.1, on the 11th May, 1932.

At this conference it was decided to set up a Committee which, in addition to serving as a link with the Committee on Statistics of the American Society for Testing Materials, was charged with the work of drawing up a report for the information of the British Standards Institution and the Department of Scientific and Industrial Research on the general question of the application of statistical methods in standardization, and in particular with drawing up a pamphlet which would serve as an introduction to the subject for manufacturers and others approaching problems of specification. This Society is represented by Dr. Snow (Hon. Secretary). In addition, Mr. Connor (a member of the Council) has been appointed as one of the representatives of industry.

The Committee held their first meeting under the Chairmanship of Mr. B. H. Wilsdon of the Department of Scientific and Industrial Research, Building Research Station, on Thursday, 26th May, 1932, at the offices of the Department of Scientific and Industrial Research, 16 Old Queen Street, S.W.1. At this meeting it was definitely decided to draw up a pamphlet as indicated, and the work of drafting has been entrusted to Dr. E. S. Pearson of University College, London. Certain other matters were also discussed by the Committee, but it is too early to indicate their exact nature.

The Committee are anxious to establish contact with firms and individuals who are interested in statistical methods as applied to standardization and allied problems with a view to the interchange of information. Any Fellows of the Society who are able and willing to furnish information are requested to communicate with the Hon. Secretaries.

It is expected that arrangements will be made next session for a paper on the whole subject to be read before the Society.

In a Statistical Analysis of American Divorce (published in this country by P. S. King & Son for the Columbia University Press), Dr. Alfred Cohen reaches the conclusion that at present about 18 per cent. of all American marriages end in divorce. Inter-state migration, changes in marriage and divorce legislation, and the desire for remarriage are three factors that have frequently been held to be important causes of the enormous increase, but this study does not support these beliefs. Figures for 1928, however, show that two-thirds of the divorces came from the childless married population and 20 per cent. from families with a single child. In addition to childlessness the three principal measurable factors that have been studied are economic production, urbanization, and the wider sphere of women's work. All these, it is concluded, have probably affected the phenomenon of rising divorce, but they are so interwoven and so many interacting influences are involved that it is really impossible to measure their relative importance. In addition it is impossible to apply any statistical analysis to such factors as the growth of individualism, the growing social approval of divorce, or religious decline, so that the real causes of the increase in divorce remain largely indeterminate.

The Statistical Bureau of Amsterdam has recently issued a report on criminality within the city and amongst its citizens outside Amsterdam (Statistische Mededeelingen uitgegeven door het Bureau van Statistiek der Gemeente Amsterdam, No. 94, Feb. 1932, price f. 1.50). The data relate to the quinquennium 1923 to 1927, the first period after the war in which, it is said, criminality assumed its normal aspect. They are analysed in a series of sixty-eight tables, with reference to type of crime, age, sex, civil state, religion, legitimacy of birth, influence of drink, repetition of offences and various permutations and combinations of these factors. The tables have their headings in French as well as in Dutch, and the twenty-four pages of text are also summarized in seven pages of French. It is, no doubt, a report that will prove of considerable use for reference, but it can hardly be suggested that for general reading it will compete with its rivals in the field of fiction.

A batch of publications by the League of Nations lies before us. Dr. Felix Mlynarski, in a memorandum submitted to the Gold Delegation of the Financial Committee, discusses *The Functioning of the Gold Standard.* Among post-war changes he notes the disappearance of gold from circulation, concentration of gold, use of gold exchange standard, greater strictness in reserve requirements, increasing number of banks buying but not selling gold, etc. The functioning of the standard has become less automatic through the accumulation of capital in bank deposits on which credit is based and through open-market operations. In considering the adequacy of the world supply of gold he subjects to severe criticism Prof. Cassel's view that a 3 per cent. inflow of new gold annually is required and holds "that Sauerbeck's index is not satisfactory as a measure of the purchasing power of gold . . . we know this from Sauerbeck himself." Economy in the use of gold is essential and State budgets, especially in excessive social services, need to be controlled. But gold shortage has not caused the fall in prices; as credit finances production, not consumption, it cannot cure relative over-production. Methods of economizing gold, the working of the gold exchange standard, and the stabilization of the purchasing power of gold are then discussed. "The stabilization of the purchasing power of gold cannot be reconciled with the gold standard system, because it would lead to a falling-off in the production of gold." Finally, "the future of the gold standard depends only in part on the production of gold. It depends to a far larger degree on: (1) The development of means of economy in the employment of gold; and (2) On the normal accumulation of capital and smooth movement of capital from the countries which possess it in excess to the countries which suffer from a shortage of working funds." The final *Report of the Gold Delegation* is a comprehensive document reviewing the position of the gold standard since the war and discussing the changes in the purchasing power of gold and their causes and remedies. A rise in prices is regarded as desirable; changes in price arising from monetary factors should be avoided, but some oscillations are unavoidable and monetary policy alone cannot secure stability. Monetary policy should be directed to the avoidance of violent fluctuations in purchasing power, and with that end international indices of prices should be consulted and regard be had to various other measures of financial and industrial activity. Special emphasis is laid on "the dependence of monetary upon general economic activity" and on "the restoration of international confidence and good-will." Sundry notes of dissent or modification are appended.

A *Memorandum on Commercial Banks*, 1913–1929, prepared by the Economic Intelligence Service of the League of Nations, summarizes the banking position of 31 countries, first in generalized tables giving comparative figures for the leading elements of bank accounts by percentage methods, so that the respective movements may be more easily seen, and, secondly, in reviews of the facts for each country with explanations and expositions where necessary. Another publication in the economic and financial series has a title which is self-explanatory: *Taxation of Foreign and National Enterprises*, a Study of the Tax Systems and the Methods of the Allocation of the Profits of Enterprises operating in more than one country, in France, Germany, Spain, the United Kingdom, and the United States of America. It is a stout quarto volume of 275 pages. A fourth volume of the publications relating to *Double Taxation and Fiscal Evasion* contains a collection of international agreements and internal legal provisions for the prevention of these evils. A useful summary of facts regarding the coal industry in various countries has been published by the Economic Committee of the League under the title *The Coal Problem*. While containing nothing new there is much information in little bulk.

Mr. J. W. F. ROWE has just contributed to the *London and Cambridge Economic Service* another, the third, of his painstaking and exhaustive studies of the artificial control of raw material supplies. His subject is "Brazilian Coffee," with regard to which, "broadly speaking, artificial control has been exercised almost continuously for thirty years," and "was established on a permanent basis" in São Paulo in 1924. It survived a partial breakdown in 1929, for "Brazil was determined to avoid a return to *laissez-faire* at any cost," and a "gradual and orderly process of liquidation" has now been "more or less assured." These quotations may be taken as the test for the elaborate study, historical and economic, of the trade in coffee from 1921 to January, 1932. Now that "the grosser errors and more obvious pitfalls" of control have been ascertained, Mr. Rowe thinks that "coffee defence in the future will be even more interesting to the student of economics than in the past," but in order that such study should be useful as well, the student will be well advised to familiarize himself with Mr. Rowe's investigations.

Our late President, Sir Josiah Stamp's Ludwig Mond lecture on "The Present Position of Monetary Science" (Manchester University Press, 1*s*.), is before us. Fellows will find it an admirable and useful review of the chief proposals which have been made for solving the many monetary problems that are afflicting the world to-day. These are grouped into three classes, those dealing with prices, those touching the exchanges and the balance of trade, and those relating to the maintenance of world levels of purchasing power. The difficulties involved both in the problems and in the proposals are briefly but clearly sketched, and the reader will derive from the discourse a clearer idea of what is desirable and what is attainable. Sir Josiah propounds no complete and final solution, but urges bankers to "a much more fearless exploration of new and theoretical ideas, a more determined attempt to comprehend the true relation between their functions and the working of the economic machine." He seems to regard the attribution of all our troubles to non-monetary causes as a stupefying of thought and an obstacle to improvement, but, surely, one may hold that a force may originate in industrial or commercial or political surroundings and be amplified for evil by influences deriving from monetary policy?

The 69th annual issue of *The Statesman's Year-Book* contains all the features which have made its predecessors so valuable and so familiar. This volume also has maps showing the progress of the Zuider Zee reclamation and the Manchurian railway system. Both are very clear and the latter is particularly illuminative.

The Business Administration Department of the London School of Economics, which was founded in 1930 in order to provide a comprehensive training for business management, has just completed its first year of activity. The course comprises the study of marketing, production, business finance (with appropriate training in statistical and accounting methods), and the management of staff. Classes are held in the evening as well as in the daytime. Only students with high educational qualifications are accepted. The Committee of Management includes prominent business men as well as professors of economics and commerce, and the training is brought into touch with current needs and experience by the study of actual problems (the case method), by the holding of discussions opened by business men, and by visits to factories, shops, and offices. A booklet recently issued gives full details of the scheme of study, the conditions of admission, and information with respect to bursaries and scholarships.

The Drapers' Company desire to make it known that applications for their Scholarship for Research in Business and Social Economics by Quantitative Methods and their Social Science Research Training Committee's Scholarship should be made to the Secretary of the Committee mentioned above, University College, Gower Street, W.C. 1, on or before the 1st October, 1932. Both Scholarships have an annual value of £60 and may be continued for two years. They were instituted to encourage the use of statistical and quantitative methods in the investigation of business, economic, and social problems, and are open on equal terms to men and women who have taken a University degree and are otherwise qualified to proceed to research in Economic Science. Further particulars may be obtained from the Secretary of the Committee.

STATISTICAL AND ECONOMIC ARTICLES IN RECENT PERIODICALS.

UNITED KINGDOM—

Accountants' Magazine—

June, 1932—Company reconstruction schemes—a criticism.

July, 1932—Half-truths in audited accounts: *J. H. Wilson.*

Bankers' Magazine—

May, 1932—The national debt: its burden and possibilities of reduction: *A. H. Gibson.*

June, 1932—Progress of banking in Great Britain and Ireland during 1931. Government credit, commodity prices, and monetary policy: *A. H. Gibson.* The price levels: *E. G. Peake.*

July, 1932—The banking half-year. International trade and the World Economic Conference: *E. F. Davies.* Problems for the World Economic Conference: *A. H. Gibson.*

Barclay's Bank, Monthly Review, July, 1932—The growth of public expenditure.

Biometrika, May, 1932—On the normality or want of normality in the frequency distributions of cranial measurements: *E. M. Elderton* and *T. L. Woo.* The sampling distribution of the third moment coefficient—an experiment: *Joseph Pepper.* A preliminary classification of Asiatic races based on cranial measurements: *T. L. Woo* and *G. M. Morant.* On the mean character and variance of a ranked individual, and on the mean and variance of the intervals between ranked individuals: *Karl Pearson* and *Margaret V. Pearson.* A comparison of the accuracy of two types of quadratic formulæ: *E. S. Martin.* A simple non-normal correlation surface: *H. L. Rietz.*

East India Association, Journal, April, 1932—The Indian worker: *Hon. J. H. Whitley.*

Economic Journal, June, 1932—British foreign investments in 1930: *Sir Robert Kindersley.* The pressure of population in the Far East: *J. B. Condliffe.* The financing of public works during depression: *Professor Jens Warming.* Aspects of the English currency system: *L. Alston.* Money and capital, a reply and a rejoinder: *Professor F. A. von Hayek* and *P. Sraffa.* Decreasing costs: a mathematical note: *R. G. D. Allen.* L. von Bortkiewicz: *Professor J. A. Schumpeter.*

Economica, May, 1932—A case against technical progress: *N. Kaldor.* The foundations of a mathematical theory of exchange: *R. G. D. Allen.* The great German inflation: *L. Mises.*

UNITED KINGDOM—*Contd.*

Eugenics Review, April, 1932—The social problem group: *E. J. Lidbetter.*

Financial Review of Reviews, June, 1932—Present position of Empire trade and the coming Ottawa Conference: *J. B. C. Kershaw.*

Faculty of Actuaries, Transactions, Part II, 1932—Continuous disability insurance: *W. A. Robertson.*

Institute of Actuaries, Journal, Part I, 1932—Currency: *F. C. Goodenough.* Review of the recent trend of mortality in England and Wales: *P. G. Brown.*

Journal of Tropical Agriculture—

April, 1932—The cacao industry of Trinidad, some economic aspects: Part I, Scope of investigation: *C. Y. Shepard.*

May, 1932—The cacao industry of Trinidad, some economic aspects; Part II, General history of the production and consumption of cacao: *C. Y. Shepard.*

Lloyds Bank, Monthly Review—

March, 1932—World depression and Franco-German economic relations (whole number).

April, 1932—Reflections on the sterling exchange: *J. M. Keynes.*

May, 1932—The European economic dilemma and the interests of the United States: *Professor J. M. Clark.*

June, 1932—The Soviet state. Some fiscal experiments on the Continent: *E. L. Hargreaves.*

July, 1932—The reduction of the budget: *Sir Ernest Benn.*

Manchester School, No. 1, 1932—The objective basis of economics: *G. W. Daniels.* Municipal finance: *Lady Simon.* High wages and international prices: *E. P. Adarkar.* Purchase and payment in the export trade: *L. F. Behrens.*

Midland Bank, Monthly Review, June–July, 1932—The gold standard: end or means?

Ministry of Agriculture, Journal—

April, 1932—Rationing of dairy cows; recent progress. Bovine tuberculosis and its relation to the disease in man: *S. H. Gaiger.* Improvement of pastures: Report of the Pasture Sub-Committee of the Advisory Committee on Agricultural Science.

May, 1932—A western counties farmer in 1700: *G. E. Fussell.* Possible careers in the poultry industry: *P. A. Francis.*

June, 1932—The prolificacy of sheep: *J. F. H. Thomas.*

July, 1932—Angora rabbits under the Colony system: *J. B. McDougall.*

Public Administration, April, 1932—Agricultural education and research in the east of Scotland: *Professor E. Shearer.* Mixed undertakings: *Sir William E. Hart.* American office management: *Myra Curtis.*

UNITED KINGDOM—*Contd.*

Public Health, April, 1932—The trend of diphtheria: *James S. Anderson.* Causes of the decline in tuberculosis mortality: *G. Lissant Cox.*

Royal Agricultural Society of England, Journal, Vol. 92, 1931—The work of the Harper Adams College Pig-feeding Experimental Station: *Charles Crowther.* Wool marketing under co-operative methods: *F. C. J. Swainson.* A century of wages and earnings in agriculture: *C. S. Orwin.*

Royal Meteorological Society, Quarterly Journal—

April, 1932—The presentation of meteorological data: *R. G. K. Lempfert.*

July, 1932—Soil physics in relation to meteorology: *B. A. Keen.*

Westminster Bank Review, June, 1932—Britain's overseas investments.

INDIA—

Indian Journal of Economics, April, 1932—England's debt to Indian Handicrafts: *P. J. Thomas.* Some aspects of rural credit and the problem of banking development in rural India: *H. L. Chablani.*

AUSTRALIA—

Economic Record, May, 1932—Economic aspects of Empire tariff preference: *H. R. Rodwell.* Bulk handling of wheat in Australia: *F. S. Alford.* Age distribution of Australian population: *H. J. Exley.*

IRISH FREE STATE—

Department of Agriculture, Journal, No. 1, 1932—Agricultural credit: *P. F. Walsh.*

UNITED STATES—

Actuarial Society of America, Transactions, October, 1931—Canada life mortality experience, 1900–1927: *W. A. P. Wood.* Unemployment relief: *Henry Moir.* Report of Committee on Aviation Statistics—May, 1932.

American Academy of Political and Social Science, Annals, May, 1932—Modern insurance developments (whole number).

American Economic Review, June, 1932—Significance of stock exchange boom: *Lindley M. Fraser.* Land, capital, and opportunity cost: *R. W. Souter.* Incidence of real estate taxes: *Herbert D. Simpson.*

American Philosophical Society, Proceedings, No. 2, 1932—Unemployment insurance: *S. S. Huebner.*

United States—*Contd.*

American Statistical Association, Journal, March, 1932, Supplement—Papers and proceedings of the ninety-third annual meeting of the American Statistical Association. The topics include: The depression: The functioning of gold. Criminal statistics. Public health. Future population and business planning. Statistical methodology. The depression: banks and credit. Census enumeration areas.

Harvard Business Review, April, 1932—The evolution of Fascist economic practice and theory: *Shepard B. Clough.* Norwegian shipping after the World War: *J. C. Egeland.*

Journal of Political Economy—

April, 1932—The psychological foundation of the law of demand: *Umberto Ricci.* The application of the quantitative method to economic history: *A. P. Usher.* The unemployment problem in Australia: *E. Ronald Walker.* Capital production and consumer-taking—a rejoinder: *Ragnar Frisch.*

June, 1932—The relation between the velocity of circulation of money and the "velocity of circulation of goods," 1: *Arthur W. Marget.* The Canadian monetary situation: *C. A. Curtis.*

Milbank Memorial Fund, Quarterly Bulletin, April, 1932—Statistics of morbidity: *E. Sydenstricker.* The fertility of specific occupational groups in an urban population: *F. W. Notestein* and *Xarifa Sallume.*

Monthly Labor Review, May, 1932—Accidents in manufacturing industries, 1926–30. General survey of wages in Estonia, Finland, Italy, Latvia, Lithuania, Netherlands, and Yugoslavia.

Quarterly Journal of Economics, May, 1932—Foreign investment and the terms of trade: *C. R. Whittlesey.* A comparison of the rates of earning of large-scale industries: *H. E. Summers.* Some neglected aspects of Gresham's law: *F. W. Fetter.* The mobility of capital: *Lawrence Seltzer.* Member bank indebtedness and net demand deposits in the Federal Reserve System: *Lauchlin Currie.* Meaning of rationalisation; an analysis of the literature: *R. A. Brady.*

Review of Economic Statistics, May, 1932—The construction industry in 1932: *W. C. Clark.* Revision of the index of general business conditions: *Edwin Frickey.* Electrical power data as indexes of business fluctuations: *Eunice S. Coyle.*

Wheat Studies of the Food Research Institute, Stanford University, May, 1932—Survey of the wheat situation, December, 1931 to March, 1932.

Argentina—

Revista de Ciencias Económicas—

January, 1932—La crisis monetaria internacional: *Julio Broide.* Equilibrio financiero: *Audax.* Los gastos y el precio de costo industrial: *Miguel Torres.*

March, 1932—Comisiones descontadas: *José Botti.* Algunas observaciones al presupuesto para el ãno 1932: *Juan Givelli.*

April, 1932—La situación financiera actual: *V. M. Molina.*

BELGIUM—

Bulletin de l'Institut des Sciences Économiques, May, 1932—Sur la méthode représentative en statistique : *Armand Julin.* Le mouvement des chèques postaux envisagé comme indice du mouvement général des affaires : *Étienne de la Vallée Poussin.*

Revue du Travail, May, 1932—L'évolution de la technique agricole et main-d'œuvre : *M. A. Wauters.*

DENMARK—

Nationaløkonomisk Tidsskrift—

Hefte 1–2, 1932—Sverige och Krisen : *Gunner Myrdal.* Den Handelspolitiske Stilling ude og hjemme : *P. Munch.* Kredit og Valuta : *J. Pedersen.*

Hefte 3, 1932—Landmændenes Indtægter og Skatter i de Sidste ti Aar : *K. J. Kristensen.* Skandinavisk Toldpræference : *J. C. Jørgensen.*

EGYPT—

L'Égypte Contemporaine—

February–March, 1932—L'assurance de responsabilité : *L. Mazeaud.* La crise monétaire anglaise (partie 1) : *Abd El Hakim el Rifai.* The currency situation and the choice of a standard for Egypt : *S. Lackany Bey.*

April, 1932—La seconde phase de la crise égyptienne : *G. Blanchard.*

FRANCE—

Bulletin de la Statistique Générale de la France, April–June, 1932—Essai de détermination de la circulation monétaire annuelle en France de 1870 à 1913 : *Jules Denue.* Variations comparées de la production, des prix, et des cours des actions pour quelques industries : *Alfred Sauvy.*

Bulletin de Statistique et de Législation Comparée, December, 1931—Les contributions directes en 1930. Espagne—la réforme du régime de la Banque d'Émission.

Journal des Économistes—

April, 1932—Le budget de 1932 : *Édouard Payen.*

May, 1932—Les bons de la défense nationale : *Pierre Caubone.* L'étatisme envahissant : *Fernand-Jacq.*

June, 1932—La vraie figure du socialisme : *Édouard Payen.* L'étalon or, les prix et la spéculation : *Michel Carsow.*

Journal de la Société de Statistique de Paris—

April, 1932—La statistique en Allemagne et en France : *V. de Marcé.*

May, 1932—L'importance statistique de la crise économique actuelle et l'examen critique des moyens préconisés pour la combattre : *Paul Razous.*

June, 1932—Le mouvement de dépopulation en France : *Louis Bouis.* La démographie du Japon : *G. Ichok.*

FRANCE—*Contd.*

Revue d'Économie Politique, March–April, 1932—Questions monétaires de l'heure présente (including: Le mécanisme de l'étalon-or: a-t-il été faussé? *Charles Rist.* La crise de l'étalon de change-or: *F. Mlynarski.* Les projets de restauration du bimétallisme et le problème de l'argent: *Frederic Jenny.* Les perspectives d'avenir de la livre sterling: *Sir W. T. Layton.* La nouvelle politique américaine de crédit en fonction du maintien de l'étalon-or: *J. H. Rogers*).

GERMANY—

Blätter für Versicherungs-Mathematik, July, 1932—Das Trendproblem in der Konjunkturforschung: *Paul Lorenz.* Die Versicherten-Sterblichkeit in Japan: *Hans Brix.*

Deutsches Statistisches Zentralblatt—

March, 1932—Die Abweichung des Verlaufa der Sterblichkeit vom Makeham'schen Gesetz: *Karl Freudenberg.*

April–May, 1932—Die Methoden der internationalen Kriminalstatistik: *E. Hacker.*

Vierteljahrshefte zur Konjunkturforschung—

Sonderheft 25, 1932—Zur Frage der internationalen Arbeitsteilung.

—— 26, 1932—Der Immobiliarkredit. Seine Lage und Aussichten.

—— 27, 1932—Entwicklungstendenzen in der Eierwirtschaft.

—— 28, 1932—Verbrauchereinkommen und Landwirtschaft. Einkommen und Fleischverbrauch.

—— 29, 1932—Stand und Ursachen der Arbeitslösigkeit in Deutschland.

Heft 1, 1932. *Teil* B—Die Konjunktur einzelner Wirtschaftszweige.

Weltwirtschaftliches Archiv—

April, 1932—Monopolistische Preispolitik in der Depression: *Alexander Mahr.* Zur Theorie der Konjunkturschwankungen: *Fritz Brock.* Strukturelle Voraussetzungen wirksamer Industrielzölle: *Herbert Gross.* Die Exportpolitik und das Problem der Exportfähigkeit der U.S.S.R.: *Paul Czechowicz.* Das Problem des wirtschaftlichen regionalen Zusammenschlusses der innereuropäischen Staatenwelt und seine Bedeutung für Deutschland: *Boris Ischboldin.* Die Industrialisierung der Britischen Dominions und die Rückwirkung auf ihre weltwirtschaftliche Stellung: *Fritz Borck.*

July, 1932—Ungelöste Probleme der gegenwärtigen Krisis: *Bertil Ohlin.* Die Welthandelsentwicklung und das Problem der deutschen Ausfuhrpolitik (Aus dem Institut für Weltwirtschaft und Seeverkehr). Das sogenannte Gesetz der abnehmenden Aussenhandelsbedeutung: *Max Victor.* Die Weltwirtschaftskrisis: *Fritz Sternberg.*

Zeitschrift für die Gesamte Versicherungswissenschaft, July, 1932—Betrachtungen zur Preisbildung in der Privatversicherung: *Hans Tamm.*

HUNGARY—

Journal de la Société Hongroise de Statistique, No. 4. 1931—Les minorités et la statistique des nationalités: *Béla Foldes.* Le problème des réparations, observations et critiques: *Eraldo Fossati.*

ITALY—

Annali di Economia, March, 1932—F. Y. Edgeworth e le nuove teorie economiche : *G. Del Vecchio.*

Le Assicurazioni Soc'ali—

No. 1, 1932—L'assicurazione nazionale malattia e pensioni nella Gran Bretagna : *Hilton Young.* Appunti sulla disoccupazione : *R. Del Giudice.*

No. 2, 1932—L'assicurazione obbligatoria del lavoratori agricoli : *Antonio Garbasso.* La disoccupazione e la morbidità : *J. Janko.* La riforma dell'assicurazione infortuni : *Gino Arias.*

(Supplements to these numbers contain the articles in their original French and English.)

La Riforma Sociale—

March-April, 1932—Il problema della seta in Italia : *E. Giretti.* Perchè la cooperazione di produzione ha conseguito scarsi progressi : *B. Riguzzi.* Confessioni di un industriale : *Luigi Einaudi.*

May-June, 1932—Un fattore fondamentale delle fluttuazioni economiche : *G. U. Papi.* Il costo della burocrazia dello stato : *F. A. Repaci.* Piani : *L. Einaudi.* E possibile la riduzione autonoma della tariffa doganale ? : *G. Carano-Donvito.*

Giornale degli Economisti—

March, 1932—Contributo alla determinazione del concetto di imposta generale sul reddito : *Renzo Fubini.* Le grandi scoperte : la teoria del protezionismo : *E. Corbino.*

April, 1932—Fuo una curva di domanda esser crescente ? : *Umberto Ricci.* Bilancie dei pagamenti internazionali e riserve auree : *Vincenzo Porri.* La soppressione delle riparazioni e la bilancia dei debiti e dei crediti della Germania : *Alberto Breglia.*

Rivista Italiana de Statistica, Economia e Finanza—

March, 1932 - Gli autori della crisi : *A. De' Stefani.* Alcuni risultati del censimento del Aprile 1931—IX : *F. Savorgnan.* Intorno alla curva dei redditi di Amoroso : *R. d'Addario.*

June, 1932- Il barometro economico : *F. Vinci.* La stato e la vita economica : *A. De' Stefani* and *L. Amoroso.* Correlazioni tra prezzi e curve statistiche di domanda e offerta : *M. Fanno.* Sui metodi di studio della dinamica economica : *F. Vinci.*

Giornale dell' Istituto Italiano degli Attuari, April, 1932—Sulla teoria degli errori : *B. Hostinsky.* Alcune formule appartenenti alla statistica rappresentativa : *K. G. Hagstroem.*

Giornale di Matematica Finanziaria, March, 1932—Sulla supermortalità dei rischi subnormali : *F. Insolera.* Previsioni demografiche : *F. Giaccardo.*

SWEDEN—

Ekonomisk Tidskrift—

Häft 3, 1931—Felet i Sveriges valutspolitik: *David Davidson.* Till frågan am gränsnyttelärans betydelse: *F. H. Brock.*

Häft 4, 1931—Några synpunkter på prisstabilisering i länder med fri myntfot: *John Lindberg.*

SWITZERLAND—

Journal de Statistique et Revue Économique Suisse, Fasc. 1, 1932 – La Suisse, centre international d'affaires: *G. Paillard.* La formule générale de la baisse du taux de la natalité en Suisse depuis le début du XXe siècle: *L. Hersch.* Der Fremdenverkehr in den grosseren schweizerischen Gemeinden im Jahre 1930: *H. Freudiger.*

INTERNATIONAL—

International Labour Review—

April, 1932—The employment of women since the war: *Antonina Vallentin.* Prison labour, II: the employment of prisoners. A further examination of the effects of mechanisation in agriculture in the United States.

May, 1932—Employers' associations in the United States: *Magnus W. Alexander.* Socialist towns: a new development of housing policy in the U.S.S.R.: *G. Mequet.*

June, 1932—Education and relative wage rates: *A. G. B. Fisher.* Agricultural wages in Australia: *D. B. Copland* and *O. de R. Foenander.* The purchasing power and the consumption of Belgian workers at different periods: *M. Gottschalk.*

METRON—

Vol. IX, Part I—Contributi alla determinazione degli indici di variabilità per alcuni tipi di distribuzione: *L. Galvani.* Sui metodi proposti per il calcolo della differenza media: *B. de Finetti.* La fecondità delle Aristocrazie-4. Le case principesche d'Italia, Germania, Austria, Ungheria, Russia, Polonia: *F. Savorgnan.*

Part II—On the circular test of index numbers: *C. Gini.* Frequency distributions with given statistics which are not all moments: *G. L. Edgett.* Orphanhood in relation to demographic factors. A study in population analysis: *A. J. Lokta.* Il problema demografico nel mondo antico: *E. Ciccotti.*

Parts III–IV—Intorno alle curve di concentrazione: *C. Gini.* Dell' interpolazione parabolica nel caso in cui entrambi i valori delle variabili sono affetti da errori accidentali: *G. Pietra.* On the distribution of statistics in samples from a normal population of two variables with matched sampling of one variable: *S. S. Wilks.* Sulla legge di probabilita degli estremi: *B. de Finetti.* Ueber die Mechanik der Massenprozesse (Kollektivgegenstandlehre): *A. N. Scukarev.*

ADDITIONS TO THE LIBRARY.

Since the issue of Part II, 1932, the Society has received the publications enumerated below :—

I.—OFFICIAL PUBLICATIONS.

(a) United Kingdom and its several Divisions.

United Kingdom—

Agriculture, Ministry of—

Economic series No. 30. Report on the marketing of dairy produce in England and Wales, Part II. Butter and cream. London : H.M.S.O., 1932. 9¾" × 6¼"; 152 pp. 6*d*.

—— *and Scottish Office*. Report of the second inter-departmental committee on the grading and marking of beef. London : H.M.S.O., 1932. 9½" × 6"; 67 pp. 1*s*.

Colonial Office—

Report by Sir Sydney Armitage-Smith, K.B.E., C.B., on a financial mission to the Leeward Islands and St. Lucia. Cmd. 3996. London : H.M.S.O., 1932. 9½" × 6"; 107 pp. 2*s*.

Constitution of Ceylon. . . . Cmd. 3862. London : H.M.S.O., 1931. 9" × 6"; 102 pp. 1*s*. 6*d*. (From Mr. H. T. Curwen.)

Economic Advisory Council—

Committee on Education and Supply of Biologists, Report. London : H.M.S.O., 1932. 9½" × 6"; 68 pp. 1*s*.

Committee on Empire Migration, Report. London : H.M.S.O., 1932. 9¼" × 6"; 90 pp. 1*s*. 6*d*.

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Ministero delle Finance Ufficio di Statistica Statistica delle imposte di fabbricazione dal 1 luglio 1930 al 30 giugno 1931 Rome, 1932 13½ × 9½, 196 pp

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Ministry of Agriculture and Forestry Statistical abstract, 1930 Tokyo, the Ministry, 1931 10 × 7¼, xix + 263 pp ¥ 2 30

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Bulletins 551—Wages and hours of labor in the boot and shoe industry, 1910–30 87 pp 20 c

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— 92—Wage-earning women and the industrial conditions of 1930: a survey of South Bend. 84 pp. 15 c.

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JOURNAL
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THE OVERSEAS TRADE OF THE UNITED KINGDOM, 1924–31.

By HENRY W. MACROSTY, O.B.E., B.A.

[Read before the Royal Statistical Society, May 24, 1932,
the President, SIR J. C. STAMP, G.B.E., LL.D., D.Sc., in the Chair.]

ONE of the objects of the Royal Statistical Society is the condensation and arrangement of materials published in diffuse forms, and the initiation of a new economic regime suggests the desirability of pursuing this object by undertaking a survey of British overseas trade at the beginning of the new era and during the years leading up to the change. For this purpose the year 1924 affords a convenient starting-point. Industry was then settling down after the fever and collapse which followed the end of the war; it was the first complete year after the separation of Irish Free State statistics; it was the year of the third Census of Production, and it forms the basis for the Board of Trade Index of Production and Index-number of Wholesale Prices. It is proposed first to survey British Overseas Trade as a whole and in its chief categories of "Food, Drink, and Tobacco," "Raw Materials," and "Manufactured Goods." Secondly, the chief groups of commodities within these main classes will be examined with special reference to the state of our export trade in 1929 and 1931. Thirdly, some notes will be given on the chief groups of commodities so as to indicate the main characteristics of each trade. In this last part, space forbids any complete analysis, and, as will be seen, even the attempt to limit the work to the chief features of trade and the factors affecting them has occupied many pages in giving only a scrappy account.

The data are drawn mainly from "The Annual Statement of Trade of the United Kingdom" and the monthly "Accounts relating to Trade and Navigation of the United Kingdom," together with the quarterly articles in the *Board of Trade Journal* on "Volume and Value of Our Overseas Trade." Other articles in that *Journal* have also been used, and the "Statistical Abstract of the United Kingdom" and "Statistical Tables relating to British and Foreign Trade and Industry" (Part I, Cmd. 3737: Part II, Cmd. 3849) are other sources.

I. THE GENERAL SURVEY.

The Volume of Trade.

Trade is recorded by value and by quantity in various units, and comparison of the data for different years is affected by changes in average values and by alterations in the quality of goods which continue to bear the same name. The aggregate value of British exports in 1931 was 51·4 per cent. less than the aggregate value of exports in 1924, but between the two years there was a fall of 28·2 per cent. in average values. The Board of Trade have, accordingly, for some time attempted to calculate the "volume" of trade passing in the several years after changes in value have been eliminated. For each year they have given a comparison between the import and export trade of the year 1924, which is taken as a base (except in 1926 and 1927, when the base year was 1925), and of the year under review, "as revalued on the basis of the average values shown by the records of the earlier period. These figures establish a relation between the volume of our external trade in the two periods, eliminating as far as possible the factor of price changes, and they also furnish an index of the aggregate effect of the alterations in prices which have taken place in the intervening years. By relating these data to similar data previously calculated in respect of preceding periods, we are enabled to review broadly the trend of our overseas trade on a quantitative basis and also the price variations experienced in that trade since 1924" (*Board of Trade Journal*, January 22, 1931). In relatively minor parts of the various groups of commodities, where quantities are not declared, it has been necessary to make estimates in order to cover all goods imported. Further, the same designations in the trade returns may not cover goods of precisely identical kinds and qualities in the different years compared. These defects, however, do not impair the value of the calculations as showing the trend of trade and the approximate amplitude of its variations.

The following tables show for retained imports and British exports, (*a*) declared values, (*b*) values recalculated on the 1924 basis, (*c*) the volume of trade as compared with 1924, and (*d*) average values as compared with 1924.

These eight years are plainly divided into two periods, one,

TABLE I.

Retained Imports, 1924–31.

Particulars.	1924.	1925.	1926.	1927	1928.	1929.	1930.	1931.
	(In Million £s.)							
I. Food, Drink, and Tobacco :								
Declared	541	538	503	512	503	509	451	397
Revalued	541	532	528	553	548	566	573	619
	(In per cent. of 1924.)							
Volume	100·0	98·3	97·5	102·4	101·1	104·7	105·8	114·3
Values	100·0	101·1	95·2	92·5	92·0	90·0	78·7	64·0
	(In Million £s.)							
II. Raw Materials and Articles mainly Unmanufactured :								
Declared	324	334	318	281	268	285	212	148
Revalued	324	346	386	366	328	365	327	305
	(In per cent. of 1924.)							
Volume	100·0	106·7	119·0	113·0	101·3	112·8	101·0	94·1
Values	100·0	96·8	81·9	76·2	81·8	78·1	64·9	48·1
	(In Million £s.)							
III. Articles wholly or mainly Manufactured :								
Declared	266	288	290	297	292	305	283	244
Revalued	266	298	318	342	345	360	361	370
	(In per cent. of 1924.)							
Volume	100·0	112·2	119·3	128·4	129·7	135·3	135·6	139·1
Values	100·0	96·5	91·1	86·7	84·6	84·8	78·5	66·6
	(In Million £s.)							
IV. Total (including Animals, not for food, and Parcel Post, non-dutiable) :								
Declared	1137	1167	1116	1095	1075	1111	958	798
Revalued	1137	1181	1235	1265	1226	1297	1267	1303
	(In per cent. of 1924.)							
Volume	100·0	103·9	108·6	111·2	107·8	114·0	111·3	114·6
Values	100·0	98·8	90·4	86·6	87·7	85·7	75·6	61·2

from 1924 to 1929, of expanding trade, followed by two years of depression from which we have not yet emerged. The year 1925 showed a small decline in exports, chiefly due to a decrease of one-sixth in the tonnage of coal exported and to a small reduction in iron and steel, the impulse given to those industries by the French occupation of the Ruhr having exhausted itself. If coal and iron be excluded there was a volume increase of 1·15 per cent. Some revival was indicated as the year went on, but in the winter fears of industrial trouble disturbed men's minds and impeded business.

Table II.

British Exports, 1924–31.

Particulars.	1924.	1925.	1926.	1927.	1928.	1929.	1930.	1931.
				(In Million £s.)				
I. Food, Drink, and Tobacco:								
Declared	57	55	50	52	54	56	48	36
Revalued	57	55	53	57	60	68	64	51
				(In per cent. of 1924.)				
Volume	100·0	96·3	93·7	100·5	105·8	119·5	112·2	89·7
Values	100·0	100·2	94·9	91·4	90·0	81·8	75·6	67·0
				(In Million £s.)				
II. Raw Materials and Articles mainly Unmanufactured:								
Declared	106	84	47	76	70	79	64	47
Revalued	106	95	58	98	96	108	91	75
				(In per cent. of 1924.)				
Volume	100·0	89·5	55·2	91·9	89·8	101·4	85·3	70·2
Values	100·0	88·6	79·4	78·1	73·4	73·1	70·2	63·2
				(In Million £s.)				
III. Articles wholly or mainly Manufactured:								
Declared	619	617	539	564	579	574	440	291
Revalued	619	628	583	646	668	676	543	403
				(In per cent. of 1924.)				
Volume	100·0	101·5	94·2	104·4	107·9	109·3	87·7	65·2
Values	100·0	98·2	92·8	87·3	86·7	84·8	81·2	72·3
				(In Million £s.)				
IV. Total (including Animals, not for food, and Parcel Post):								
Declared	801	773	653	709	724	729	571	389
Revalued	801	795	712	819	838	868	711	511
				(In per cent. of 1924.)				
Volume	100·0	99·3	88·9	102·3	104·7	108·3	88·7	67·6
Values	100·0	97·3	91·7	86·5	86·3	84·1	80·3	71·8

Consequently, there was a slight recession in the first quarter of 1926, exports of raw materials (chiefly coal) decreasing in volume by about 4 per cent. and those of manufactured goods by 1·2 per cent. as compared with the first quarter of 1925. The coal stoppage interfered with business during the rest of the year, but the reduction in the volume of exports over the whole year was surprisingly small; compared with 1924 it was 11·2 per cent. in all commodities, 44·8 per cent. in coal and raw materials, and 5·8 per cent. in manufactured goods. The real burden imposed on industry by the effort to carry on is shown in the retained imports, where all commodities showed an increase of 8·6 per cent. over 1924, raw materials 19·0 per cent. (chiefly due to imports of coal), and manufactured goods 19·3 per cent. The effects of the stoppage were continued into 1927 in two ways. Imports were swollen by deliveries of coal, iron and steel, and other goods which had been ordered on period contracts during the stoppage, and on the other hand, exports were increased during the early months while firms were engaged in working off old contracts which had been delayed. When those were finished, British exporters found that they had to compete for orders with foreign firms who had occupied their markets during the strike, but during the second half of the year there was a recovery and exports of manufactures were over 6 per cent. greater than they had been in the corresponding half of 1925, whereas the increase for the whole year was only 2·9 per cent. A fall of about one-eighth (from 17*s.* 10*d.* per ton in 1927 to 15*s.* 7*d.* in 1928) in the average export value of coal was coupled with a decline of about 2 per cent. in tonnage, but the export trade in articles of food and drink and in manufactured commodities was active and continued into 1929, when the volume of total exports for the year was 8·3 per cent. in excess of that for 1924. After the troubles of 1926 and the continuing inability of the coal trade to compete, this was no small achievement for the other British industries.

Meanwhile imports had increased still more rapidly. Food, drink, and tobacco showed only casual movements up to 1928, owing to the tendency to reduce imports of cereals and meat. The less fundamental necessaries included in this category increased with some rapidity—itself a sign of prosperity—and jumped in 1929 to 13·4 per cent. above 1924. As already noted, the volume of retained imports of raw materials in 1926 and 1927 was artificially swollen, but whereas in 1925 it had been 6·7 per cent. above 1924, it was only 1·3 per cent. above 1924 in 1928. The chief factor in this relatively unfavourable situation would appear to be the reduction in the imports of raw cotton and linters from 1,768 million centals in 1925 to 1,452 million centals in 1928, a reduction not entirely offset by increases in wool and in materials for other industries. The reconciliation of this relative stagnation in the importation of raw materials with the more rapid increase in the exportation of manufactured goods is probably to be found in the fact that a considerable part of the retained imports of manufactured goods consists of semi-manufactured goods which are used as materials in many British industries. Crude non-ferrous metals are the most conspicuous example of such goods, and the volume of non-ferrous metals and manufactures thereof imported into and retained in the United Kingdom increased by 23·4 per cent. between 1924 and 1929, while British exports of similar goods increased by 24·6 per cent. Other examples are crude iron and steel, some yarns, some kinds of leather, some chemicals, raw drugs, etc. The increase in the retained imports of articles wholly or mainly manufactured between 1924 and 1929 is almost the most important and to some extent the most alarming feature of the period. Already in 1925 it was 12·3 per cent. above 1924, and in 1926 and 1927 it received a considerable impulse owing to the coal stoppage and the General Strike; in 1927 the volume of imports of iron and steel and manufactures thereof was 87·8 per cent. above 1924, but in 1928 it fell to 38·8 per cent. Electrical goods and apparatus increased in imports by 142·3 per cent. in 1929 over 1924, although British exports increased by 30·8 per cent.; retained imports of machinery increased by 86·5 per cent. and exports by 23·7 per cent. The frequently repeated phenomenon of an increase in the imports of manufactured goods together with an increase in the exports of goods of classes bearing the same description suggests two conclusions. One is that the British home market was showing a remarkable absorptive power, and the other is that a large part of the imports were worked up into more finished forms or used in combination with other goods to form new constructions, which were then exported as British manufactures. In one important case the imports cannot be regarded as competitive with British goods, namely, the imports of refined petroleum, for the British refining industry is only supplementary to the import trade; taking all kinds of refined petroleum together, retained imports rose from 1,048 million gallons in 1924 to 1,606 million gallons in 1929. This fact must be borne in mind when comparing the aggregate growth of imported manufactures with the aggregate growth of exports of British manufactures.

Although it was the collapse of speculation in the United States in the autumn of 1929 which ushered in the present period of depression, the effects did not show themselves in British trade till later, as is shown by the following table showing the volume of British exports in the respective quarters of 1929–31, taking the quarterly average of 1924 at 100 :—

Period.	1929.	1930.	1931.
January to March	106·7	99·9	68·9
April to June	106·5	87·4	65·6
July to September	109·1	85·0	66·0
October to December	110·9	82·7	69·9
Year	108·3	88·7	67·6

All classes of British exports were affected by the decline when it once started, and in 1930 only the class of food, drink, and tobacco remained above the level of 1924, though about 6 per cent. in volume below 1929; in 1931 there was a fall of 16·9 per cent. below 1930. Exports of raw materials in 1930 were about 15·9 per cent. below 1929, and in 1931 a further 17·9 per cent. less in volume than in 1930, but in the last quarter of 1931 the reduction compared with the last quarter of 1930 was only 10 per cent. Manufactured goods showed a decline in volume of 19·9 per cent. in 1930 compared with 1929, and in 1931 a further loss of volume of 25·8 per cent. compared with 1930; in the last quarter of 1930 the loss of volume was nearly 28·1 per cent. compared with the corresponding quarter of 1929, and the loss continued to the second quarter of 1931, after which there was a small increase for the next two quarters. Coming to retained imports, we note that the heavy fall in prices stimulated imports of food and drink, but not those of materials. The increase in food was most marked in meat and "other" food, but even cereal imports were larger in 1931. The loss of volume in retained imports of raw materials in 1930 compared with 1929 was 10·5 per cent., and in 1931 compared with 1930 it was about 6 per cent.; the last quarter of 1931, however, gave some signs of improvement, for retained imports were over 6·7 per cent. greater than in the corresponding quarter of 1930. Cotton and wool accounted for about 47·4 per cent. of the total declared value of retained imports of raw materials in 1924, but in 1931 the volume of cotton and waste retained had fallen off by 25·6 per cent., whereas the volume of wool, waste, and rags was higher than in 1924 by 37 per cent., having increased steadily since 1928; part of this wool may have gone into stock. Retained imports of manufactures were substantially the same in volume in 1930 as in 1929, but increased a little in 1931 principally owing to "abnormal" importations in anticipation of the imposition of import duties. The increase in such imports was greatest in the second half of the year and particularly affected goods of a luxury character or of domestic consumption; heavy imports of a capital nature declined.

Prices.

The fall in import and export values has been continuous since 1924, but up to 1929 it was moderate—14·3 per cent. in retained imports and 15·9 per cent. in British exports—but in the next two years the decline was more hurried—28·6 per cent. in retained imports and 14·6 per cent. in exports. In 1929 compared with 1924 the reduction in the average values of food, drink, and tobacco was for retained imports 10·0 per cent. and for exports 18·2 per cent.;

the difference appears to be due to the fact that imported (mainly raw) tobacco fell by 17·3 per cent. in value and exported manufactured tobacco 32·3 per cent., but, as will be shown later, there is some element of unreality about these figures. Retained imports of raw materials showed a fall of 21·9 per cent. and exports of 26·9 per cent.; the former are dominated by cotton, where the reduction was 35·5 per cent., and the latter by coal, which had decreased 29·9 per cent. Manufactured goods showed the same reduction, 15·2 per cent. in imports and exports, which is something of a statistical curiosity considering their very different make-up. In the next two years the fall in values approached the precipitous. By 1931 it had reached, for retained imports and compared with 1924, 36·0 per cent. in food, etc., 51·9 per cent. in raw materials, 33·4 per cent. for manufactures, and 38·8 per cent. for all goods. In the case of British exports, the reductions were 33·0 per cent. for food, etc., 36·8 per cent. for raw materials (for coal 30·2 per cent.), 27·7 per cent. for manufactures, and 28·2 per cent. for all goods. For the British manufacturer raw materials form the most important class of imports, and it is of consequence to observe that the fall in average values of retained imports of this class of goods was about 16·9 per cent. for 1930 compared with 1929 and nearly 26 per cent. for 1931 compared with 1930. British exports of manufactured goods showed reductions of 4·3 per cent. in 1930 compared with 1929 and of 11·0 per cent. in 1931 compared with 1930.

The values of commodities entering into international trade may be compared with domestic prices as follows :—

Price Movements, 1924–31.

(1924 = 100.)

Particulars.	1925.	1926.	1927.	1928.	1929.	1930.	1931.
Average Values :							
Gross Imports	101·1	91·6	87·6	88·6	86·2	75·7	61·1
Exports of Imported Produce	112·1	104·6	97·3	86·3	92·4	76·6	59·1
Retained Imports ...	98·8	90·4	86·6	87·7	85·7	75·6	61·2
Exports of British Produce	97·3	91·7	86·5	86·3	84·1	80·3	71·8
Wholesale Prices :							
Board of Trade Index-number	95·8	89·1	85·2	84·4	82·1	71·9	62·6

The fall in British home prices has, except in 1925, closely paralleled that of gross imports because to a great extent it is composed of primary commodities for which regular, and world, prices are quoted in the wholesale markets, similar quotations being not, as a rule, readily available for manufactured goods. British prices up to

1930 fell more than import prices partly because they include coal (which is not imported, except in 1926–7) and partly because, on the average, round about a quarter of the value of gross imports is represented by manufactured goods. When we compare the average values of raw materials and those of manufactures we get a wider difference:—

Average Values of Raw Materials and Manufactures, 1924–31.

(1924 = 100.)

Particulars.	1925.	1926.	1927.	1928.	1929.	1930.	1931.
Retained Imports of Raw Materials	96·8	81·9	76·2	81·8	78·1	64·9	48·1
Retained Imports of Manufactures	96·5	91·1	86·7	84·6	84·8	78·5	66·6
British Exports of Manufactures	98·2	92·8	87·3	86·7	84·8	81·2	72·3

Prices of manufactured goods contain a larger amount of labour than imported materials, and its remuneration has, until quite a recent period, varied but little, and, consequently, prices of manufactured goods are always less variable than those of primary products. On the other hand, the bounty of nature and improvements in cultivation have placed on world markets increasing quantities of primary products at a rate more rapid than world industry could absorb them. Their prices naturally fell, and with prices the remuneration and purchasing power of the producers, who were no longer able to take the same quantities of manufactured goods at the only prices at which it would pay manufacturers to supply them. The utilization of profits gained in earlier years kept trade going for a time, as it did with farmers at home, but the exhaustion of resources had to come at last. The collapse of American speculation merely gave the last push to a tottering edifice which sent it crashing; but for the application of that extraneous force, world trade might have taken a few more years to crumble slowly. The discrepancy between prices of raw materials and manufacturing costs was bound to bring disaster in the end. One example of this discrepancy will suffice. According to the prices published by the Board of Trade, the spot price of American middling cotton at Liverpool fell from 16·30*d*. per lb. at the average of 1924 to 4·97*d*. in November, 1931, or by 69·5 per cent., while the price of 36-in. sheetings (46 yards, 12 lbs.) fell only from 24·07*s*. to 11·97*s*., or by 50·3 per cent.

Another aspect of the fall in prices, and one which affects broad masses of the population, is that it, and particularly the fall in food prices, has greatly reduced the cost of living from 75 per cent. over 1914 in 1924 to 64 per cent. in 1929 and to 48 per cent. at the end of

1931, at the last date the increase in the price of food only was 32 per cent compared with 54 per cent in 1929 and 70 per cent in 1921. As the average level of the rates of wages in 1921 and up to 1930 was from 70 to 75 per cent above that of July, 1914, the improvement in the condition of persons in employment is manifest.

The Home Market

The Board of Trade compile an Index of Production based on the output of 1924 being taken as 100. It is available since 1928, and may be compared with some of the figures relating to trade:

Production and Trade, 1927–31.

(Base, 1924 = 100.)

Particulars	1927	1928	1929	1930	1931
Retained Imports of Raw Materials Volume	113·0	101·3	112·8	101·0	94·1
British Exports of Manufactures Volume	104·4	107·9	109·3	87·7	65·2
British Exports of All Goods Volume	102·3	104·7	108·3	88·7	67·6
Board of Trade Index of General Production	—	105·5	111·8	103·3	93·7
Board of Trade Index of Manufactures ..	—	109·4	115·5	106·3	96·7

Imports of raw materials in 1927 have to be discounted for the inclusion of coal, but apart from this there would appear to have been some stocking of materials which were carried over into 1928. During the next three years the index of general production follows closely the index of imported raw materials. In the last quarter of 1929 the index was 114·0, the highest for the year, and in the last quarter of 1930 it was 99·0, the lowest for the year. The low point in 1931 was reached in the third quarter at 89·3, and in the fourth quarter it rose to 96·8, a recovery which seems to be more than seasonal.

The population of the United Kingdom was 44·0 million in 1921, 45·4 million in 1927, and 46·1 million in 1931, an increase of 2·67 per cent since 1924. During 1924–30 production, both in general and of manufactured goods, increased more rapidly than population and more rapidly than general exports. From this it is a fair deduction that the home market expanded for home manufactures (including mining products), besides being able to absorb the increasing imports of articles wholly or mainly manufactured, so far as they were ready for consumption or were not stocked as in 1931. It will already have been observed that the volume of retained imports of food and drink also increased more rapidly than population, so that, all round, the position of people who were able to pay for goods was far from unfavourable, and the condition of those of straitened means was much less hard than it otherwise might have been.

Agriculture is not included in the Index of Production, and the position of producers has notoriously been unsatisfactory, though for the rest of the population its deficiencies have been more than made up by imports. Mining also has been less productive than in 1924; even in 1929 its index was only 96·8, and in 1931 it was 81·6. Manufacturing industries by themselves had an index of 115·5 in 1929, of 96·7 in 1931, and of 99·6 in the last quarter of 1931. The pictures given by the Index of Production may be supplemented by the figures of the number of insured persons in employment (after allowing for persons directly engaged in trade disputes or absent owing to sickness, etc.), except in agriculture and railway transport. Their number, representing those engaged in the production and distribution of goods, rose from 9,438,000 in the first quarter of 1924 to 10,299,000 in the third quarter of 1929, and thereafter declined to 9,215,000 in January, 1931, and again rose to 9,593,000 at the end of 1931. Taking the yearly averages there was an increase from 9,514,000 in 1924 to 10,207,000 in 1929, an increase of 7·3 per cent. As the increase in production in that period was 11·8 per cent., we can conclude that there was a substantial improvement in manufacturing technique and organization to permit the larger output. This is one of the factors which has enabled us to maintain so large a number of unemployed persons, which has never been less than a million, and, except in 1925, fluctuated round about 1,200,000 in 1924 9. With the slump the numbers rapidly increased, rising to 2,897,000 at the end of September, 1931, and falling to 2,574,000 in the third week in December, 1931.

Trade and Shipping.

The Board of Trade publish statistics showing the net registered tonnage of vessels entered and cleared with cargo at ports in the United Kingdom, but no information is available as to the extent to which these vessels are loaded compared with their capacity. "Capacity," it may be noted, is a term of variable meaning, for a vessel loaded with light cargo may have all space filled and yet not be "down to her marks," while another with heavy cargo may be "down to her marks" with a good proportion of empty space. Some rough idea of the degree of loading or of the extent to which shipping space is occupied at different times may, however, be obtained by comparing the index of the volume of gross imports with the index of the tonnage entered with cargoes and the index of the volume of exports of British and foreign produce with the index of the tonnage cleared with cargoes. Another useful comparison with clearances is obtained by constructing an index of coal exports, for coal is by far the largest bulk cargo shipped from the United Kingdom. These comparisons are made in the following table:—

Indices of Shipping and Trade, 1924–31.

Particulars.	1924.	1925.	1926.	1927.	1928.	1929.	1930.	1931.
Shipping entered with cargoes:								
Mill. net tons...	55·4	55·5	64·2	60·6	60·3	62·7	63·7	60·3
Index	100·0	100·3	115·9	109·4	109·0	113·2	115·1	108·9
Volume of Gross Imports:								
Index	100·0	103·4	106·3	109·3	105·7	110·9	108·1	110·6
Shipping cleared with cargoes:								
Mill. net tons...	65·3	62·3	47·0	63·5	64·4	68·7	65·9	58·3
Index	100·0	95·4	71·9	97·2	98·7	105·2	100·8	89·3
Coal Exported:								
Mill. tons ...	61·7	50·8	20·6	51·1	50·1	60·3	54·9	42·8
Index	100·0	82·4	33·4	83·0	81·2	97·9	89·0	69·3
Volume of Exports of British and Foreign Produce:								
Index	100·0	99·1	88·3	100·3	102·2	104·8	87·6	69·0

It would appear, with regard to inward trade, that loading was somewhat better in 1925 than in 1924, but worse in 1926, while 1927 was at about the 1924 level. Loading got worse again in 1928, improved a little in 1929, worsened in 1930, and improved in 1931, perhaps on account of the number of vessels laid up. With regard to outward cargoes a smaller shipping tonnage was utilized in each of the years 1925 to 1928 than in 1924; clearances (in tonnage) were 5·2 per cent. greater in 1929 than in 1924, but fell nearly to the basic level in 1930 and well below it in 1931. The volume of exports advanced more rapidly than the volume of shipping, so that loading improved in 1925–8, conspicuously in 1926 on account of the number of vessels that were laid up, thus providing better cargoes for the others; the improvement was much about the same in the other three years. In 1929 loading was in about the same relation to capacity as in 1924, but in the last two years it has got progressively worse, despite the extensive laying-up of vessels. Comparison with the coal figures suggests that there was a distinct increase in the space occupied by other cargo, and so far as that was "measurement" cargo it doubtless provided a better paying freight for the shipowner. The proportion of British tonnage in the inward cargo trade was round about two-thirds in 1924–8, but then fell off slowly to 63·4 per cent. in 1931; in the outward cargo trade British tonnage was 63·9 per cent. of the whole in 1924, rose to 72·1 per cent in 1926, fell to about two-thirds in the next three years and to 64·7 per cent in 1930, but recovered in 1931 to 65·4 per cent. Whether the individual foreign ships were on the average better or worse loaded than British ships it is impossible to say from the figures. If, however, loading factors be constructed on the ratios of the shipping indices to the trade indices, for the purpose of adjusting the amount of tonnage entering or clearing from British ports with cargoes, and if the Board of Trade calculation that the gross earnings of British shipping in 1924 were £155 million (*Board of Trade Journal*, January 21, 1926) is accepted, then when the Chamber of Shipping freight index is applied, an estimate is obtained for gross shipping earnings (after allowing for passenger earnings) lower than the net earnings as calculated by the Chamber for 1928 and 1929, so that the loading of British ships must have been better than is suggested by the Table.

Distribution of British Overseas Trade.

The *Board of Trade Journal* for February 18, 1932, contains an article setting forth the distribution of British Overseas trade in 1924, 1930, and 1931, and from it the following particulars are taken:—

British Overseas Trade.

(In percentages.)

Countries from which Goods were imported or to which Goods were exported	Gross Imports			British Exports			Re-exports		
	1924	1930	1931	1924	1930	1931	1924	1930	1931
Self-Governing Dominions	19 01	18 67	19 51	23 55	21 59	25 17	15 43	17 78	19 53
India	6 17	4 89	4 26	11 31	9 28	8 30	0 80	1 48	1 25
Colonies, Possessions, and Protectorates	5 03	5 56	4 96	6 81	9 64	10 07	2 66	4 32	4 38
Total British Countries	30 21	29 12	28 73	41 67	40 51	43 54	18 89	23 58	25 16
Europe and Soviet Russia	31 71	39 11	42 62	30 79	32 27	31 27	57 11	56 30	55 29
Africa	4 01	2 23	2 06	3 71	3 77	3 90	6 11	7 19	7 04
Asia	3 83	3 96	3 61	8 52	5 70	5 83			
United States	18 88	11 70	12 08	6 71	4 30	4 10	17 56	12 93	12 51
Rest of America	11 22	10 31	10 58	8 53	9 72	7 73	See above, with Africa and Asia		
Polynesia, etc.	0 08	0 19	0 32	0 01	0 03	0 03			
Total Foreign Countries	69 79	70 88	71 27	58 33	59 49	56 46	81 11	76 42	74 84
Total All Countries	100 00	100 00	100 00	100 00	100 00	100 00	100 00	100 00	100 00
Total All Countries—£ Million	1,277	1,044	862	801	571	389	140	87	64

The most conspicuous change on the import side is the smaller share provided by the United States, due to a decrease in the quantities and values of cereals and cotton imported. Next comes the greater relative position of Europe, due to the increase in imports from Germany having grown from 2·89 per cent. in 1924 to 7·44 per cent. in 1931. On the export side, the share of the Self-Governing Dominions has increased slightly and would have been greater but for the restrictions placed on imports by Australia in her time of financial distress. Exports to the Commonwealth were 7·59 per cent. of the whole exports in 1924 and 3·74 per cent. in 1931, the amount per head of the Australian population falling from £10 9*s*. 3*d*. to £2 4*s*. 9*d*. Exports to the Irish Free State rose from 5·90 per cent. to 7·82 per cent., but fell per head from £15 14*s*. 9*d*. to £10 6*s*. 7*d*. Exports to Canada rose from 3·50 per cent. to 5·28 per cent., but fell from £3 1*s*. 2*d*. per head to £1 19*s*. 9*d*. Exports to New Zealand fell from £15 0*s*. 7*d*. to £7 9*s*. per head. All these reductions per head largely reflect price changes. The decline in the Indian percentage is probably due in great part to the boycott of British goods, but it has been more than offset by the increased percentage of our exports taken by the Colonies, Possessions, etc. In Europe, France took the largest share of our exports in 1931, followed by Germany and the Netherlands, but Germany took only 5*s*. 8*d*. per head of her population in 1931, while France took 10*s*. 11*d*. and the Netherlands 34*s*. 4*d*. In proportion to their size, however, Norway and Denmark were our best customers outside the Empire, taking, respectively, goods to the value of 53*s*. 9*d*. and 48*s*. 5*d*. per head of their populations in 1931. The United States was distinctly of less importance as a customer in 1930 and 1931 than in 1924, and the percentage of our exports going to Japan fell from 3·33 in 1924 to 1·58 in 1931. The percentage going to Argentina was 3·40 in 1924, 4·42 in 1930, and 3·80 in 1931.

Germany in each of the three years took about a fifth of our re-exported goods, but the United States took only an eighth in 1931 instead of more than a sixth as in 1924. The Irish Free State took 8·01 per cent. of the total in 1924 and 13·39 per cent. in 1931, and France, after advancing from 12·69 per cent. in 1924 to 16·71 per cent. in 1930, fell back to 14·80 per cent. in 1931.

The United Kingdom and World Trade.

In 1913 the United Kingdom held about 16 per cent. of the world's import trade and 13 or 14 per cent. of the world's export trade; the percentages cannot be given precisely owing to defective Dutch statistics. In 1924 our percentage of import trade was 17·62 per cent. and that of export trade 12·94 per cent., but by 1929 these percentages had fallen to 15·40 and 10·86 per cent. respectively. As we have seen, the volume of our import trade had risen in the course of these five years by 14·1 per cent. and the volume of our export trade by 8·3 per cent., although the money expression of our trade had been reduced. But in the same period, in spite of the fall in general prices, the world's imports, expressed in money, had risen by

11·8 per cent. and the world's exports by 8·5 per cent. The aggregate of world trade had increased much more rapidly than that of the United Kingdom and, therefore, the rates of the latter to the former had fallen. The chief factor was the recovery of Germany partly natural, partly artificial, under the necessity of paying war debts and reparations so that her share of exports rose from 5·75 per cent. to 9·82 per cent., a figure still well behind the 12·39 per cent. enjoyed in 1913. In export trade, moreover, the United States decreased from 16·45 per cent. to 15·77 per cent. and France from 7·85 per cent. to 6·00 per cent., while the Netherlands, Belgium, Italy, and Japan improved their position somewhat.

In the *Board of Trade Journal* for March 3, 1932, particulars are given of the world trade in 1931 for a number of countries whose aggregate import trade for domestic consumption in 1929 was 84·3 per cent. of the aggregate import trade of all countries and whose aggregate export trade in home produce and manufactures was 81·9 per cent. of the aggregate export trade of all countries. From these particulars the following table has been compiled; the figures in brackets under 1929 are the percentages of the trade of the individual countries referred to that of the world as a whole :—

World Trade in 1929–31.

(Approximately four-fifths of the whole.)

Country.	Retained Imports.			Domestic Exports.		
	1929.	1930.	1931.	1929.	1930.	1931.
United Kingdom ...	18·3 (15·4)	19·4	21·9	13·2 (10·9)	13·0	12·2
United States ...	14·9 (12·4)	12·7	11·8	19·3 (15·8)	17·7	15·3
Germany	10·8 (9·1)	10·3	9·0	12·0 (9·8)	13·4	14·7
France	7·7 (6·5)	8·6	9·3	7·3 (6·0)	7·8	7·7
Other Countries ...	48·3 (40 9)	49·0	48·0	48·2 (39·4)	48·1	50·1
All Countries ...	100·0 (84·3)	100·0	100·0	100·0 (81·9)	100·0	100·0
All Countries : £ Million... ...	6,078	4,938	3,641	5,506	4,395	3,188

For the sample as a whole imports were 19·8 per cent. and exports 20·2 per cent. less in 1930 than in 1929 and 26·3 per cent. and 27·5 per cent. less respectively in 1931 than in 1930. The declared value of the imports of the United Kingdom in 1931 was 28·2 per cent. less than in 1929, indicating an actual increase in volume after allowing for the fall in prices, but account should be taken of the abnormal imports in 1931 in anticipation of import duties. Imports into the United States were 52·5 per cent. less in 1931 than in 1929, and imports into Germany 50 per cent. less, while the decrease in the case of France, 27·5 per cent., was similar to that of the United Kingdom.

The declared value of exports from the United Kingdom in 1931 was 46·6 per cent. less than in 1929, but the United States showed a greater reduction of 53·9 per cent.; the reductions in the cases of France and Germany were 39·3 and 28·8 per cent. respectively. Allowance has to be made for the change in prices, and this cannot be easily calculated for the world as a whole; average values of retained imports into the United Kingdom fell by 28·6 per cent. between 1929 and 1931 and average export values by 14·6 per cent., but it would be hazardous to accept the reductions either as applying to other countries or as expressing the changes in world prices.

It seems evident that during the last three years international trade has diminished in volume. The United Kingdom has taken a substantially greater proportion of the world's imports, but the shares of the United States and Germany have diminished while that of France has increased. On the export side the British share has decreased, but not so much as that of the United States; Germany has increased her share sensibly and that of France has also increased in a small degree. By buying more and selling less the United Kingdom has involved her "balance of trade" in difficulties, which have then been enhanced by financial troubles. The United States by insisting on payment of war debts and at the same time shutting out goods by high tariffs has compromised her export trade. The figures show Germany forcing exports in order to pay reparations and then restricting imports to restore her financial stability. France, largely self-maintaining except when markets are bad, has for the time being made moderate progress, but her export position has got steadily worse during 1931.

Declining international trade is a disturbing phenomenon. France and the United States have compromised the whole economic structure of the world by demanding payment of war debts and reparations and refusing to take payment in goods. Their accumulation of gold has imperilled the exchanges, and all the debtor countries have been striving to sell and not to buy. Unwillingness to purchase and improvements in production have co-operated to produce a relative superfluity of primary products and to bring down their prices so that the producers cannot buy goods from the industrial countries at prices which would be remunerative to the manufacturers. Want of confidence in the economic situation has spread through Europe like a plague, and the sight of the United States flung out of her artificial, paper-valued, instalment-bought prosperity into a trough of the deepest depression has made all countries try, at whatever hazards, to conserve their funds. The fear to buy is universal, and everywhere the old doctrine that if you will not buy you cannot sell is abandoned. Germany, France, the Netherlands, Switzerland, Czechoslovakia, and several other countries have established quotas for fixing the amounts of a variety of goods that can be imported into their countries. Further, a number of countries in Europe and South America have placed restrictions on exchange so that exporters who have sold goods to them cannot obtain payment. And everywhere since the war tariff walls have been raised higher. If we are to move ever farther away from the principle of the international division of labour, if countries will only sell and not buy (except raw materials), international trade must diminish and such goods as are sold must be dumped at unremunerative prices. The world level of costs must then rise and consumers be relatively worse off. This may or may not concern us, but what does concern us is that we are a great exporting nation and that, if we cannot expand our markets, our industry and population must dwindle, unless in the alternative we can achieve a vast reconstruction and live mainly on home trade. Whether by giving up free trade we shall be able to force a general lowering of tariffs and thus release trade from some of its present impediments is a matter we cannot discuss here. Certain it is that world recovery is impossible unless the canker of war payments can be excised altogether or its malignancy greatly reduced, that useless expenditure on armaments must be pruned away, that tariffs must be reduced, that the work of primary producers must be made remunerative, and that the efficiency of manufacture must be increased. Only in proportion as these are achieved can prosperity return to industry and trade.

II. THE TRADE OF THE SEVERAL INDUSTRIES.

The Limitations of the Volume and Value Calculations.

Before discussing the volume and value of trade in the separate industrial groups in which commodities imported or exported are recorded, some attention must be given to the limitations under which such calculations can be used. It must first be noted that the units of measurement in which goods are reckoned may be very imperfect when changes in quantity and quality are taking place. Motor-cars, for example, are recorded by number, but, even if the price at any moment reflects differences in quality, the numbers imported or exported at different times when prices have changed meanwhile give no real measure of any change in the importance of the trade. We may draw two conclusions. First, that the wider the classification the more likely is it that errors in one direction will be balanced by errors in the opposite direction, and that, consequently, most reliance should be placed on the calculation of changes in the volume and value of import trade or export trade as wholes and in the three main classes of food, etc., raw materials, and manufactured goods, which make up nearly all the trade. Calculations relating to the large groups inside these classes may also have a reasonable degree of validity, but the smaller groups should be handled with much discretion. Secondly, that calculations of change within a narrow range of years may be accepted as reasonably indicative of the truth, but that when the range is extended, troubles will arise. Over an extended period of years the character of trade changes, the relative importance of its parts varies, new industries may arise, and, therefore, the weighting of the base year may lose much of its significance. It is desirable, accordingly, to change the base year at frequent intervals, and this the Board of Trade has now done, selecting the year 1930 instead of 1924; that is not an ideal year for a base, by any means, but at least it has the advantage of synchronizing with the period for which the Fourth Census of Production has been taken.

A disquieting discrepancy is discussed in the *Board of Trade Journal* for January 21, 1932, from which the following extract is taken:

"The trade of the year 1924 has been revalued at the average values of the year 1930, using the information available in the Annual Statement of Trade, and this revaluation has, accordingly, a greater degree of precision than the corresponding revaluation of the trade of the year 1930 on the basis of the average values of the year 1924, which was made on the information available in the December, 1930, issue of the monthly 'Accounts Relating to Trade and Navigation of the United Kingdom.' A comparison of the results of the two revaluations shows that the change of base year has an important effect on the calculated changes in the volume of trade and in the average values of the goods imported and exported in the course of the six years' interval under consideration. In the following table the indices of change in the volume of trade (1924 = 100) during the interval 1924–30, for the main classes and for the totals of imports and domestic exports, are shown as calculated on the basis of average values in 1924 and in 1930 respectively:—

Relation of the Volume of Trade in 1930 *to that in* 1924.

Class of Trade.	Total Imports, at Average Values of		Domestic Exports, at Average Values of	
	1924.	1930.	1924.	1930.
Food, Drink, and Tobacco	105·0	111·1	112·2	98·9
Raw Materials and Articles mainly Unmanufactured	95·7	94·2	85·3	84·0
Articles wholly or mainly Manufactured	130·5	124·7	87·7	85·7
Total	108·0	109·2	88·7	86·1

"The broad result of the revaluation at the average values of the later year is thus seen to be an increase of about 1 per cent. in the quantity of goods imported and a decrease of nearly 3 per cent. in the volume of domestic exports as compared with the results obtained from estimating the trade of both years at the average values of the year 1924. While the divergent changes in the average values in the different groups in the two years is mainly responsible for these altered figures, the changes within some of the groups has in certain cases an effect which cannot be neglected." This is illustrated by exports of the food, drink, and tobacco groups where the two estimates of volume are 112·2 and 98·9. " This wide variation is due almost entirely to a difference in respect of the tobacco group, the respective index-numbers for which are 204·9 and 126·4. The tobacco exported consists largely of cigarettes, and in 1924 nearly three-quarters of these were manufactured in bond, the average values of such cigarettes in that year being slightly less than that of those manufactured from duty-paid tobacco. Since 1924, however, the practice of manufacturing cigarettes in bond has been almost completely discontinued (exports of such cigarettes in 1930 being about 4 per cent. only of the total), and the average value entered for cigarettes manufactured in bond was, in 1930, about 80 per cent. higher than that of those manufactured from duty-paid tobacco. . . . The considerable divergence between the two index-numbers for imports of food, drink, and tobacco is due to a similar difference in one group, viz. dutiable food and drink, the index-numbers for which are 106·1 and 200·9, based on average values in 1924 and 1930 respectively. In this case, again, a change in practice is important, the refining of sugar in bond having ceased after April, 1928."

These differences in valuation must not be taken as throwing grave suspicion on the utility of the figures for purposes of comparison. They are only significant in the case of imports and exports of food, drink, and tobacco, where the percentage differences are 5·8 per cent. and 11·9 per cent. respectively, and less in the case of imports of manufactures, where there is a difference of 4·4 per cent. The differences for the raw materials class are only 1·6 per cent. for imports and 1·5 per cent. for exports; for exports of manufactures the difference is 2·3 per cent. By excluding tobacco from the calculations we obtain the following comparisons :—

Volume of British Exports, 1924–31.

(1924 = 100.)

Particulars.	1925.	1926.	1927.	1928.	1929.	1930	1931.
Food, Drink, and Tobacco	96·3	93·7	100·5	105·8	119·5	112·2	89·7
Food and Drink only ...	94·3	88·8	94·7	96·7	107·0	100·0	87·6
Total Exports	99·3	88·9	102·3	104·7	108·3	88·7	67·6
Total, excluding Tobacco	99·1	88·4	101·7	104·1	107·5	87·7	67·1

When tobacco is taken out of the food group the movement is still in the same direction as when it remains in, but is less violent. The exclusion of tobacco from the total of exports makes very little difference in the volume movement. If similar calculations are made with respect to imports, the figures for food and drink only and for all retained imports are so large relatively to the figures for tobacco that the volume movements are practically unaltered. The conclusion, therefore, is that, subject to the cautions already given, the figures for the movements of volume and value of trade published by the Board of Trade can be safely used. They must not be taken as mathematically precise. It is sufficient that they should indicate correctly the direction of the movement and give a fair representation of its amplitude as between near years. Too detailed an analysis will only mislead the investigator. And, finally, the figures must be taken as applying only to trade with all countries in the aggregate; they cannot be applied to the trade with individual countries owing to its varying make-up. This fact cannot be stressed too much.

British Export Trade in 1929.

In the Appendix, tables are given showing for each class and group of commodities the changes in volume and average value from 1924 and 1931 for both import and export trade. We shall first compare here the position of British export trade in 1929 with that in 1924, dividing trade groups according as (A) their volume in 1929 was 20 per cent. or more above their volume in 1924; (B) under 20 per cent. above that for 1924; and (C) less than in 1924. Groups I C and I D (Meat and Animals Living, for Food) have been taken together for convenience; so also have the following groups in Class II:—Iron Ore and Scrap (C), Wood and Timber (E), Silk, Raw, Knubs, and Noils (H), Other Textile Materials (I), Rubber (M), and Miscellaneous Raw Materials (N), which, except the miscellaneous group, are relatively quite small.

Class A is unduly swollen by the inclusion of tobacco, which has already been discussed. On the other hand, in Class C the values placed on articles exported by parcel post are conventional. Neglecting these points, about 37·7 per cent. of the export trade of the United Kingdom in 1929 showed increases in volume which in only one group were less than 21 per cent. above 1924 and averaged. over all the groups included, 41·6 per cent. increase. About 19·5 per cent. of the trade, Class B, showed an average increase of 14·5 per cent. ranging from 19·8 to 0·3 per cent. and in four groups exceeding 10 per cent. These more or less satisfactory results were largely offset by decreases averaging 12 per cent. in groups of commodities covering 42·8 per cent. of the exports of 1929. Class A, which was reasonably

British Exports, 1924 *and* 1929.

Kind of Goods.	At 1924 Values.		
	1924.	1929.	
	Value.	Value.	% of 1924.
	£ Mill.	£ Mill.	
A. 20% *or more over* 1924 *in* 1929 :			
Machinery (III G)	44·8	55·4	123·7
Vehicles (III R)	29·7	61·1	206·1
Other Textiles (III L)	27·5	35·7	129·7
Chemicals, etc. (III N)	25·5	33·1	129·7
Non-ferrous Metals (III D)	15·7	19·5	124·6
Pottery, Glass, etc. (III B)	12·9	15·5	120·7
Electrical Goods, etc. (III F)	10·7	14·0	130·8
Cutlery, etc. (III E)	8·8	10·7	121·4
Tobacco (I G)	6·5	14·1	215·7
Sundry Raw Materials (II C, E, H, I, M, N)	5·3	9·4	176·7
Rubber Manufactures (III S)	3·3	4·3	129·0
Wood Manufactures (III H)	2·3	3·4	147·4
Silk Goods (III K)	2·2	2·8	126·5
Papermaking Materials (II L)	1·9	2·4	128·0
Non-ferrous Ores, etc. (II D)	1·4	2·6	192·3
Miscellaneous Manufactures (III T)	32·9	43·5	132·4
Total	231·4	327·5	141·6
B. *Less than* 20% *over* 1924 *in* 1929 :			
Iron and Steel (III C)	74·2	85·8	115·7
Food and Drink (I E and F)	38·0	43·9	115·6
Paper, etc. (III Q)	9·2	11·1	119·8
Oils, etc., Manufactured (III O)	8·9	10·1	112·9
Leather, etc. (III P)	7·1	7·4	104·1
Coke, etc. (III A)	6·2	6·7	106·7
Clay, etc. (II B)	2·1	2·1	100·3
Cotton Waste (II F)	1·9	2·0	108·7
Total	147·6	169·1	114·5
C. *Less in* 1929 *than in* 1924 :			
Cotton Goods (III I)	199·2	176·0	88·4
Coal (II A)	72·1	69·4	96·3
Wool Goods (III J)	67·8	52·2	77·0
Apparel (III M)	30·0	28·2	93·9
Raw Wool (II G)	12·4	11·7	93·9
Grain and Flour (I A)	7·4	5·2	70·5
Crude Oils (II J)	6·9	6·3	90·9
Animal Foods (I B)	3·1	2·9	94·0
Hides, etc. (II K)	2·5	2·2	86·6
Animals, not for food (IV)	2·3	1·2	53·9
Meat, etc. (I C and D)	1·9	1·9	98·7
Parcel Post (V)	16·4	14·0	85·7
Total	422·0	371·2	88·0
Grand Total	801·0	867·8	108·3

successful on the whole, included those trade groups which contained "new" branches of industry, *e.g.* machinery, with internal combustion engines and electrical machinery; vehicles, with motor-cars, motor-cycles, motor-vessels, and aircraft; other textiles, with artificial silk; chemicals, with dyes and synthetic chemicals; electrical goods and apparatus, with wireless and other new devices; non-ferrous metals with material for the electrical, machinery, and building trades; tobacco, with an expanding trade in cigarettes. The two other classes do not possess such advantages, and in the third class, cotton, wool, and apparel have been hit by changes in fashion and coal by the competition of oil and electricity. Yet so great still is the size of our old exporting industries that the newer developments with difficulty made good their losses.

British Export Trade in 1931.

The year 1929 marked the end of a period of trade recovery which had lasted five years and had survived the coal stoppage and General Strike of 1926. The following year British trade was caught in the world depression and in two years the whole complexion of things was altered, as is shown by the table on p. 629, in which 1929 and 1931 are compared on the basis of their export trade recalculated at 1924 values.

Exports from only one trade group, grain and flour, showed a better position in 1931 than 1929, principally owing to increased exports of maize meal to the Irish Free State. Even the vehicle group, which had shown continued growth in 1930, now showed a decline equal to the average. Commodities in the first three classes in the table, which in 1929 contributed 77·5 per cent. of the declared value of exports, showed a decrease of 41·5 per cent. in 1931 in the volume of their exports. The next two classes furnished 21·8 per cent. of the declared value of exports in 1929 and showed in 1931 an average reduction of 25·2 per cent. in volume. It is not surprising that the "economic blizzard" struck with peculiar violence industries like iron and steel, machinery, and some sections of the vehicle industry, which are largely engaged in the production of capital goods, and the prevailing poverty will also account for decrease in the exportation of personal luxuries like cigarettes and expensive forms of clothing, but the arrangement of trade groups in a scale of declining exports baffles explanation. Our greatest export industries—cotton, wool, iron and steel, machinery—all showed reductions of over 40 per cent., and coal would probably have been in the same category had it not been already depressed in 1929; but for the motor industry vehicles might also have joined.

This somewhat arid discussion may be concluded with a few notes

British Exports, 1929 *and* 1931.

Kind of Goods.	At 1924 Values.		
	1929.	1931.	
	Value.	Value.	% of 1929.
1. *Over* 50% *below* 1929:	£ Mill.	£ Mill.	
Iron and Steel (III C)	85·8	40·6	47·4
Leather (III P)	7·4	3·6	49·2
Cotton Waste (II F)	2·0	0·8	43·0
Total...	95·2	45·0	47·3
2. 40–50% *below* 1929:			
Cotton Goods (III I)	176·0	98·7	56·1
Machinery (III G)	55·4	32·1	58·0
Wool Goods (III J)	52·2	31·2	59·9
Non-ferrous Metals, etc. (III D)	19·5	10·4	53·4
Tobacco (I G)	14·1	8·3	59·0
Electrical Goods (III F)	14·0	8·3	59·9
Hides, etc. (II K)	2·2	1·2	59·1
Total...	333·4	190·2	57·0
3. 30–40% *below* 1929:			
Vehicles (III R)	61·1	37·4	61·3
Miscellaneous Manufactures (III T) ...	43·5	28·4	65·4
Other Textiles (III L)	35·7	24·2	67·8
Apparel (III M)	28·2	19·2	67·9
Pottery, etc. (III B)	15·5	10·2	65·9
Raw Wool (II G)	11·7	7·7	66·0
Paper, etc. (III Q)	11·1	7·5	67·9
Cutlery, etc. (III E)	10·7	6·7	63·1
Miscellaneous Raw Materials (II C, E, H, I, M, N)	9·4	5·8	62·5
Crude Oils (II J)	6·3	4·4	69·9
Wood Goods (III H)	3·4	2·0	60·8
Silk Goods (III K)	2·8	1·9	69·0
Total...	239·4	155·4	64·9
4. 20–30% *below* 1929:			
Coal (II A)	69·4	49·6	71·6
Food and Drink (I E and F)	43·9	34·0	77·4
Chemicals (III N)	33·1	24·1	73·1
Oils, etc. Manufactured (III O)	10·1	7·8	77·4
Coke, etc. (III A)	6·7	5·1	76·3
Non-ferrous Ores, etc. (II D)	2·6	1·8	71·4
Papermaking Materials (II L)	2·4	1·8	77·7
Clay, etc. (II B)	2·1	1·5	71·3
Animals, not for food (IV)	1·2	0·9	76·2
Total...	171·5	126·6	76·3
5. *Less than* 20% *below* 1929:			
Parcel Post (V)	14·0	11·3	80·6
Rubber Manufactures (III S)	4·3	3·6	83·4
Animal Foods (I B)	2·9	2·6	84·3
Meat, etc. (I C and D)	1·9	1·5	82·4
Total...	23·1	19·0	82·6
6. *In excess of* 1929:			
Grain and Flour (I A)	5·2	5·6	107·9
Grand Total	867·8	541·8 [1]	62·4

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[1] Calculated by the total instead of the details this amount becomes £541·5 million.

on trade. These must necessarily be rather disjointed, but they may serve to indicate the general character of our exports and some of the conditions on which recovery may depend.

III. SOME NOTES ON TRADE.

The Textile Industries.

Textile materials constituted 52·1 per cent. of the value of retained imports of raw materials in 1924, and goods made from those materials contributed 37 per cent. of the value of all British exports and 47·9 per cent. of the value of all British manufactures exported; even in 1931, textile materials were 39 per cent. of the value of retained imports of raw materials and textile goods were 24·6 per cent. of all exports and 32·9 per cent. of manufactured exports. It is plain that recovery in our export trade largely depends on recovery in exports of textiles. Cotton yarns and manufactures alone formed a little over 24 per cent. of the value of our exports in 1913, and a trifle under a quarter in 1924, but only 14·5 per cent. in 1931; exports of cotton piece goods in 1924 were, in linear yards, 64·8 per cent. of the exports of 1913, and the exports of 1931 were, in square yards, only 38·6 per cent. of those of 1924. So much has been said recently about cotton at meetings of this Society that little need be said now. Between 1924 and 1929 our exports of cotton piece goods decreased by 772 million square yards—268 million yards in the exports to India, 229 million in those to Europe, 83 million in those to China, and 47 million in those to Egypt—while exports to other British countries than India increased by 60 million yards, and those to South America were more than maintained. In the next two years we lost 1,955 million square yards—984 million in the trade to India and 108 million in that to China. The earlier losses were due to the competition of Indian and Japanese mills, the later to the poverty of the Indian peasant on account of the fall in the value of his crops, to the political boycott, and to the recent imposition of heavy import duties. The Indian mills have their own economic troubles, principally internal competition, and their equipment has not substantially increased since 1926. Given the restoration of prosperity and political peace, there seems no reason why we should not again recover the export of 1,650 million yards to India which we had in 1927, unless a policy of extreme protection of native manufactures is adopted. Internal peace in China should also restore our exports in a short time to 230 million yards as in 1924, and that was probably only about 40 per cent. of the pre-war figure. If the purchasing power of the rest of the world is restored and Lancashire at last puts her domestic house in order, there is every reason to expect that we may again get back to an exportation exceeding 4,400 million square yards as in 1920, 1924, and 1925.

Contrary to the cotton trade, the wool textile industry has suffered severely in its home trade from foreign competition, but only in light all-wool fabrics. These increased from 18·2 million square yards in 1924 to 27·2 million square yards in 1928 and then declined; at first these came chiefly from France, but latterly that country has lost to Germany. Our output of such goods is considerable (about 142·5 million square yards in 1924), and we exported 82·2 million yards in 1924, but, after a continuous decrease, only 34·2 million square yards in 1931. Altogether in 1924 about 440 million square yards of woollen and worsted tissues, all-wool and mixed, were manufactured, of which one-half was exported, while retained imports were equal to a little over 6 per cent. of the British output. In 1924 about 45·5 per cent. of our exports were all-wool goods, but in more recent years the percentage has increased towards 48 or 49 per cent. Wool textiles have suffered greatly from changes in fashion, and not only our own exports but those of France have declined since 1924, though exports from Germany, the Netherlands, Belgium, Italy, and Czechoslovakia have increased. The greatest decrease in our exports before the slump was in 1925. South America and the United States have remained relatively good markets, but exports to Canada and Australia have decreased, especially those to the Commonwealth when financial troubles caused a restriction of imports. Economic troubles in Japan and internal disturbances in China have lost us other markets. Turning to the home market, 1925 was a year of high prices and imports of raw wool decreased, to recover as prices fell, but to decrease again with the sharp rise in prices in 1928 (due to the reduction in the Australian clip), and once more to increase so that in terms of greasy wool there was an increase of nearly two-fifths in 1929 compared with 1924. Against this, however, there was a reduction in the use of recovered wool (shoddy, etc.) and of mohair, etc., but, nevertheless, the quantity of materials (taken in the scoured state) available for manufacture in the United Kingdom increased in the five years by about 24 per cent., and, as exports had declined, the home market had grown much more than the increase in population. Retained imports of raw wool increased from 483 million lbs. in 1929 to 592 million lbs. in 1931, due in part to an increase in the gross imports, but also to the decrease of over 66 million lbs. in our large re-exporting or merchanting trade, so that part of those imports may be held in stock in anticipation of future continental demand. Given a revival of world prosperity there should be a greater demand for our goods and an increase in exports. The home market appears to have been expanding for some years and will be widened by any restriction of imports.

In 1929 the production of flax in the Soviet Union and the Succession States had not yet come up to the pre-war level, and in the intervening period the linen industry of the world has suffered from dear and insufficient supplies of raw material. Only Belgium, with excellent water for retting the fibre, has been able to maintain a successful trade. Our imports of flax and tow, even in the maximum post-war year 1927, were only 60 per cent. of the pre-war quantity, and our retained imports of yarns in that same year were nearly 44 per cent. below the pre-war level. Our exports of piece goods have declined pretty steadily since 1924 to all markets, but our United States market has fallen to less than 30 per cent. of its 1911–13 magnitude, though that country has imported more from Belgium and elsewhere. Prospects of recovery in this trade are small.

Jute tells a mixed story, for retained imports of the raw material were nearly a fifth greater in 1929 than in 1924, and imports in 1931 were over four-fifths of those in 1924. Exports of piece goods increased satisfactorily up to 1928, but fell off by nearly 60 per cent. in 1931; here we have to fear the competition of Indian manufacturers. Cordage exports have been well maintained except in 1925–7 and 1930–1. Production of artificial silk in the United Kingdom rose from 24 to 52 million lbs. between 1924 and 1929, then fell to 46 million lbs. in 1930 owing to over-production, but recovered to 53 million lbs. in 1931. The woven goods produced are mainly for home consumption and make up only a trifle of the loss in cotton. After duties of customs and excise were imposed in 1925, imports of silk goods decreased and exports increased, but imports of artificial silk tissues also increased, as British production was apparently unable to supply the home market.

The Metal Industries.

The four groups of iron and steel goods, cutlery, tools, etc., machinery, and vehicles had exports in 1929 35·3 per cent. greater in volume than in 1924, and their declared value had risen from 19·7 to 25 per cent. of the value of all exports. In 1931 their volume was only about two-thirds of the volume in 1924, but owing to the greater reduction in other exports their declared value was still about one-fourth of the total value of all British exports. Most of the commodities in the group "iron and steel and manufactures thereof" are materials for other industries, such as machinery, vehicles, and building, which are mainly engaged in producing capital values. Final products such as hollow-ware, cutlery, tools, motor-cars, bicycles, etc., are either the implements of other industries, or are articles of a quasi-permanent character for personal enjoyment. Production of the commodities now under consideration, therefore, depends in part on the amount of capital being invested, that is, first on national prosperity and, ultimately, on world prosperity. New overseas issues offered on the London market were less in 1925 and 1926 than in 1924, partly owing to restrictions attendant on the return to the gold standard and partly to industrial troubles, but increased in 1927 and 1928, and have since fallen off considerably. The floating of loans does not necessarily synchronize with the exportation of the goods purchased by them, and renewals of plant (*e.g.* railway equipment and rolling-stock) may be met out of revenue or depreciation funds. A close connection between finance and export cannot be demonstrated, but it is certain that it exists with a spread in time. Personal prosperity, of course, governs the demand for pleasure cars, cutlery, and for clocks, watches, cinematograph films, photographic apparatus, etc., included in the cutlery group.

There has been serious complaint of the competition of imported goods with British-made goods, especially in the iron and steel group, and certainly the advance has been considerable. Foreign competitors got a good footing in the British market in 1926 and 1927, owing to our industrial troubles, but since then their position has been steadily reduced, so that the excess volume of iron and steel imports over 1924 was only 38·6 per cent. in 1929 and 26·5 per cent. in 1931. The very different make-up of the imports and exports has to be noted, and for this purpose analysis of the 1929 retained imports of 2,813,000 tons and exports of 4,380,000 tons will suffice. The imports were composed of crude iron and steel, 42·5 per cent.; rolling-mill products, 42·9 per cent.; more-finished products (including rails), 14·6 per cent. Exports, on the other hand, included crude iron and steel, 13·0 per cent.; rolling-mill products, 23·1 per cent.; more-finished products, 63·9 per cent. In the slump of 1931 about 55·7 per cent. of the retained imports were of crude iron and steel, while finished products were 69·5 per cent. of the exports. These figures indicate the line of our future development. We cannot go back to 1913, when we exported 1,124,000 tons of pig iron; even Belgium with cheap production from new furnaces finds it better to export to us crude steel. In 1929 our output of pig iron was about 63 per cent. and of steel about 80 per cent. of capacity, and the chief obstacle to an increase in pig iron is the increase from 20 to 50 per cent. in the use of scrap. Our imports of crude steel in that year were 10·8 per cent. of our output compared with 11·8 per cent. in 1913 and 13·7 per cent. in 1924. Our valuable export trade in galvanized sheets has been largely assisted by cheap imported steel, and it is at least doubtful whether our steelmakers can meet the imported prices, except after a considerable scrapping of obsolete blast and steel furnaces, a concentration of plant, and an improvement in organization. Cheap material is particularly imperative to-day for the galvanized sheet trade, which exports largely to agricultural countries, now the worst sufferers from the depression.

The engineering, shipbuilding, bridge-building, motor, railway rolling stock, cutlery, and tool trades are all dependent for their success on cheap steel, and they all, except the motor trade, suffer comparatively little from foreign intrusion into the home market. Here a quotation from Sir John Hunter at the Annual Meeting of Sir William Arrol & Co., Ltd. (*The Times*, March 24, 1932), demands a reply from our steelmakers:—"The steel prices in this country are fixed by the various Steelmakers' Associations. I suggest that a lowering of steel prices might induce a greater demand and at the same time might have the desirable effect of eliminating the inefficient producers, whom fixed association prices are usually designed to perpetuate. The price of steel is the same to-day as it was in December, 1929. I find the price of heavy steel scrap in 1929 was 72*s.* 6*d.* per ton and is now 37*s.* 6*d.* per ton."

Retained imports of machinery were 50,000 tons greater in 1929 than in 1924, but exports increased by 97,000 tons. Agricultural machines are the most serious import group, chiefly from the United States and Canada. Textile machinery is still our largest export group and India our chief market; attempts are being made to extend the boycott from cotton goods to cotton machinery. Cranes and hoists, internal combustion engines, water-tube boilers, pumps, sewing-machines, and electrical machinery have been rapidly developing lines of export; the decline of the steam engine is also noteworthy. Exports of machinery reached their maximum volume in 1928 and began to decrease slightly in 1929; as a trade in capital goods the downward turn in the production curve was taken earlier than was done by trades making consumption goods. Similarly, the exports of railway rails and other material was at its maximum in 1927, but the exportation of rolling stock continued to increase till 1930, as far as can be determined. Exports of new merchant ships averaged 335,000 gross tons before the war and reached that level again in 1928 with 344,000 tons; then in 1930 there was a great jump to 643,000 tons, including 356,000 tons of motor vessels, and this over-production was followed by a fall to 284,000 tons.

Ever since the end of the war it has been notorious that the carrying power of the world's mercantile fleet has been in excess of requirements, but a certain amount of replacement has had to go on, especially when a new form of transport like the motor-ship comes into use. So in 1929 the British output (excluding sailing-ships) of 1,520,000 tons gross (30·5 per cent. motor tonnage) slightly exceeded the 1909–13 average of 1,507,000 tons, and in 1930 the output of 1,472,000 tons included 760,000 tons of motor-shipping. Shipbuilding is one of the largest customers of the steel industry, but building, whether for home or abroad, must be limited and spasmodic so long as the surplus of shipping capacity continues.

It would be entering on a thorny path to seek to decide whether the development of the British motor industry since 1924 has been due more to the reimposition of the McKenna duties in 1925 or to the ability of British makers. The duties undoubtedly impeded imports, but British skill captured overseas markets although the United States and Canada are still the chief suppliers of the Dominions.

Group III E of the Import and Export List includes watches, clocks, and cinematograph films, commodities in which we must yield precedence to the foreigner, but in most classes of cutlery and tools our exports exceed our imports; exports of these goods were maintained up to 1929, but imports (except of knives) were reduced by the duty imposed at the end of 1925. Broadly speaking there is a contest between price and quality, British goods being the better and dearer.

The imports of "non-ferrous metals and manufactures thereof" are materials for the electrical, building, and other industries, and their increase in volume from 1924 to 1931 is a matter for satisfaction rather than the reverse. Retained imports of electrical goods and apparatus also increased till in 1930 they were 172·3 per cent. over 1924 (and in 1931 they were 163·0 per cent.), while British exports (which in 1924 were more than three and a third times the value of the imports) rose only to 30·8 per cent. above 1924 in 1929, and fell in 1931 to 21·7 per cent. below. The electrical industry is honeycombed with price associations, some of them international, and a reconsideration of this policy, in some directions at least, would seem to be indicated. The export trade in aluminium goods and nickel is to be noted among the "newer" and flourishing developments.

Coal.

There is little new to be said about coal. The competition of oil and electricity (and of lignite in Germany) and the development of more economical methods of coal consumption have created overproduction in all coal-raising countries. In protection of their own mining areas, France, Germany, and other countries have limited imports by quotas, to our great loss, and the folly of 1926 let Poland into our Scandinavian markets. "Reparation Coal" made a serious difference to our sales to Italy, and oil fuel again has cut into our exports of coal to foreign ports and depots for bunkering purposes. Our exports of gas coke and briquettes increased from 1924 to 1929, but exports of foundry coke declined. Something might be done by international agreement to delimit markets and fix prices so as to avoid ruinous competition, but we shall not see again coal exports at 73 million tons as in 1913, and even to get back to 62 million tons as in 1924 or to 60 million tons as in 1929 will mean a hard struggle. Further organization of the British coal-trade appears imperative.

Chemicals and Allied Trades; Oils, Fats, and Resins.

Retained imports of chemicals, dyes, drugs, and paints were valued at £13·3 million in 1924, or 52·0 per cent. of the value of British exports (£25·5 million), and their volume increased by 32·3 per cent. in 1929 against 29·7 per cent. for exports. But the imports include raw materials such as iodine and iodides, potash fertilizers, potassium nitrate, sodium nitrate, raw or simply prepared drugs (ipecacuanha, senna, etc.), and extracts for dyeing and tanning, amounting in declared value to £4,361,000, or about a third of the total, in 1924, and to £4,073,000 out of £15·9 million in 1929. Imports of coal-tar dyes, so important before the war, are now only allowed on licences granted by a board on which users are represented; there is a useful export trade, especially to India and China, but trade with the United States and Italy has been reduced by the creation of local dye industries. Benzol is another import which has been heavily reduced since 1927 by an import duty.

In "heavy" chemicals Great Britain predominates; there is a large export trade and imports are trifling. Here, perhaps, we can trace the results of concentrated management, bringing with it the possibility of international arrangements. Comparing 1929 with 1924, exports of ammonium sulphate doubled, those to British countries (of which Hong Kong accounted for nearly a half) having multiplied five times; bleaching powder also more than doubled, but there were only relatively small increases in copper sulphate, disinfectants, and sodium compounds, while glycerine and heavy coal tar oils decreased. In 1930–1 the poverty of the industrial countries caused a smaller demand for fertilizers (including those classed with miscellaneous manufactures, group III T) and for disinfectants, insecticides, etc. As for drugs, it would require a Captain Kettle to express an opinion on the proprietary medicines and other preparations which we both import and export in large quantities. We may note a large importation of medicinal oils, especially from Germany and Belgium, while our exports are much smaller, and also that the Soviet Union is a large supplier of "other medicines and drugs." With regard to paints we have competitive imports of white lead and also large imports of lithopone, not a British manufacture; but a large part of the imports are more of the nature of raw materials, while British exports are dominantly in paste or mixed for use.

In the group, III O, of manufactured oils, fats, and resins, retained imports are dominated by refined petroleum (£35·6 million out of £39·5 million in 1929), which in its various forms of fuel and lubricating oil is really to be classed as raw material. Since the war, crude petroleum has been imported, mainly from Persia, for refining in the United Kingdom, but the imports of 464,500,000 gallons in 1924 fell to 344,000,000 gallons in 1931. Meanwhile the retained imports of refined petroleum rose from 1,048 million gallons in 1924 to 1,871 million in 1930 and fell to 1,792 million in 1931. Oilseeds and nuts and crude oils are the raw materials of the seed-crushing and refining trades, which in turn produce materials for the margarine, soap, candle, paint, and tinplate industries. The various seeds and nuts differ in oil content and compete with each other according to price based on oil content, market supply, and the requirements of the final industries. Supplies of oilseeds and nuts fell from 1,726,000 tons in 1924 to 1,296,000 tons in 1927 (or by 25 per cent.); they rose in the following year to 1,530,000 tons, only to fall to 1,216,000 tons in 1930, recovering by over a ninth last year. Retained imports of crude vegetable oils rose from 126,000 tons in 1924 to 225,000 tons in 1929 and then fell to 186,000 tons in 1931. Exports of British-expressed oils fell from 113,000 tons in 1924 to 90,000 tons in 1927, recovering to 96,000 tons in the following year and then falling steeply to 53,000 tons in 1931. Our output of crude oils fell from 483,900 tons in 1924 to 330,600 tons in 1930, and our output of oil-cake from 1,454,900 tons to 1,225,600 tons. Imports of cake, consequently, increased by 23·1 per cent. to 443,000 tons, but this was a substantial falling-off from the 449,000 tons imported and retained in 1926 and the 487,000 tons retained in 1927—an eloquent testimony to the depression in agriculture. The seed-crushing trade has not held its own. On the other hand, the soap trade, which uses tallow and oils as raw materials, increased its export trade from 76,700 tons in 1924 to 81,900 tons in 1928; the usual collapse followed, to 56,000 tons in 1931. The British output (excluding that of very small firms) fell from 443,000 tons in 1924 to about 440,000 tons in 1930, a good return in an admittedly bad year.

Other Industries.

The trade groups so far considered (A, C, D, F, G, H, I, J of Class II; A, C, D, E, F, G, I, J, K, L, N, O, R of Class III; and part of I, B) account for over 74 per cent. of all British exports in 1929 and for about 82 per cent. of articles wholly or mainly manufactured. Apparel (III M), with £17·5 million of retained imports and £30 million of exports in 1924, is one of the most important of the remaining groups. Nations, even in the agricultural stage, make for themselves a great quantity of goods for personal use, such as apparel, and when they try to develop into the industrial stage they naturally build on these domestic industries. During the European war many countries which had been wont to import garments and such-like goods were cut off from their ordinary sources of supply and were forced to develop their native manufactures, and after the war the vested industries thus created were protected by tariffs. Thus the Australian and Indian markets for British boots and shoes have been practically lost and the South African market halved. Our total exports of boots and shoes of leather have fallen from 1,453,000 dozen pairs in 1913 to 1,005,000 dozen pairs in 1929 and 691,000 in 1931, and, as production in the United Kingdom increased by about one-ninth between 1924 and 1929, much more than the growth of population, the home "consumption" of boots considerably increased. Imports rose from 200,000 dozen pairs in 1924 to 322,000 dozen in 1927 and then fell to 259,000 dozen in 1930, recovering (by "forestalling") to 292,000 dozen in 1931; they are chiefly women's shoes from France and Switzerland with Belgium and Czechoslovakia coming up in the cheaper lines, while the United States is now out of the field. Exports of garments also decreased in value by over a quarter in 1929 compared with 1924 and by nearly 55 per cent. in 1931, while imports are chiefly of women's costumes and have probably increased in quantity. Exports of hats increased between 1924 and 1929, but in 1931 were less than half the pre-war figure, while imports have enormously increased. In all those lines imports are either of fashionable goods or of very cheap goods. We can hardly expect to expand in those trades. The hosiery trade has developed greatly since 1924, partly at the expense of woven goods, and the average number of operatives at work was about 88,000 persons in 1924 and in the bad year 1930, having been probably about 98,000 in 1929. Artificial silk hosiery has developed at the expense of cotton and woollen hosiery. Exports of wool stockings fell by a quarter between 1924 and 1929 and increased exports of silk and artificial silk stockings did not make up the loss. Exports of underwear of wool and cotton also decreased, and in both cases the chief loss was in the Australian market. Imports are chiefly of cotton from Germany, Czechoslovakia, Italy, Japan, and United States. Our exports of cotton stockings are small. Our hold on the home market appears to be impregnable in wool goods, but in cotton goods it weakened seriously in 1930 compared with 1924, and in silk and artificial silk hosiery foreign goods strengthened their minority position. There would appear to be some prospect of regaining part of our export trade in hosiery, especially of wool and artificial silk, at least in British markets.

Exports of pottery, glass, and abrasives (III B) increased in volume by nearly 21 per cent. between 1924 and 1929, but retained imports increased by over 44 per cent. The import trade is most serious in tiles, translucent pottery, and general earthenware, but the imports of translucent pottery have been checked by an import duty imposed in 1927. The trade in tiles is dependent on building schemes, and the importation from France, Belgium, and the Netherlands was probably for use in the south of England, the chief factor being cheap sea transport. We are untouched in sanitary ware and refractory goods, and in general earthenware our exports are much larger than imports, the trade with British countries having been well maintained and the chief loss being in the United States market. Pottery is an industry of which we should have good hopes, but in glass we must yield the palm to Belgium. Imports are, however, generally of a lower average value than exports, and in plate glass and bottles we have two categories capable of expansion.

The Census of Production shows that our production of paper increased from 1,150,000 tons in 1924 to 1,400,000 tons in 1930, and that of boards from 118,000 tons to nearly 205,000 tons; our imports of raw materials increased by nearly a quarter in that time. Imports of paper, however, increased much more, especially in newsprint, wrapping paper (somewhat checked by the duty of 1926), and boards, and in newsprint and boards countries making wood pulp have a distinct advantage; taking paper and boards together the imports increased each year in volume, till in 1931 they were 59·4 per cent. greater than in 1924. Exports increased by about a fifth in volume up to 1929; our chief export was newsprint, particularly to Australia, but Canada is now an important competitor; printing paper is also important. At a further stage of manufacture we have a considerable export of stationery, about four-fifths going to British countries where similarity of tastes brings trade. Wallpaper is also an important export, but Germany and Belgium send a large quantity of coated papers, though our exports too are increasing. Again, the prospects of export trade appear good.

Hides and skins in the Import List include fur-skins, and the volume of retained imports in 1929 was 9·8 per cent. over 1924; home production varied little. The Board of Trade index of production, based on 1924, includes leather with boots and shoes, but Mr. G. Ronald White, in a paper on "Live-Stock By-Products and By-Product Industries," read before the Royal Statistical Society on April 19, 1932, gave the following indices of production compiled by the United Tanners' Federation and also based on 1924 as 100:—96 for 1925; 89 for 1926; 97 for 1927; 98 for 1928; 85 for 1929; 89 for 1930; and 85 for 1931. The leather trade must depend largely on the fortunes of the boot and shoe trade, and on whether expansion in the home trade for boots and shoes will exceed contraction in exports of leather. Exports of leather have decreased in volume since 1927, when they were 18 per cent. above 1924, to 1931, when they were in volume little more than half the exports of 1924; they consist chiefly of undressed leather, though a remarkable development in exports of dressed upper leather to the United States since that year is to be noted. The export trade is, however, only about a sixth or a seventh of the home production (on the average), while retained imports (after allowing for rough-tanned leather imported as material) appear to be a little more than a fifth. The reason why British tanners and dressers do not supply a larger share of the home market is not evident from the statistics, but the course of the raw material prices shows that the tanning industry is sufficiently speculative. The average import value of hides and skins rose by 27 per cent. between 1927 and 1928 (when it was 22·8 per cent. above 1924), and then fell till in 1931 it was 43·1 per cent. below 1924. The hide price index of the United Tanners' Federation, taken as 100 for 1924, was 103 in March, 1927, 170 in January, 1928, and 65 in September, 1931. Hide stocks, Mr. White pointed out in the address already quoted, were low everywhere in 1927, and when in the latter half of 1927 the Continent, profiting by easy money—and particularly Russia—began to buy, prices rose. "Leather consumers in this country and in the United States, believing that hides would reach a permanently higher price level, hastened to increase their stocks of leather, with the result that the demand for hides was further stimulated." Hidden stocks of hides were brought forth and prices fell, involving in loss the tanners, who were only able to sell their leather six months or so (the length of the tanning process) after they had bought the hides.

All the groups of manufactured exports have now been scrutinized except the small groups of "manufactures of wood and timber," and "rubber manufactures," and the "miscellaneous" group, a composite of many small industries. Considerations of space compel the omission of these groups as well as of the many industries which are responsible for our exports of food and drink.

IV. CONCLUSIONS.

The survey in the preceding part confirms the conclusion arrived at in the first part of this paper—the dependence of our export trade on world prosperity. The current poverty of the countries supplying us with primary products has reduced the market for our manufactures, both consumable goods and capital goods such as equipment for railways, mines, and farms, while other industrial countries, which are also our customers, having suffered with us, are compelled to purchase less. In some important industries, such as coal and cotton, we cannot expect to recover our pre-war position, but given political peace and industrial recovery throughout the world, a return to the level of 1929 is to be expected. If we can make the further assumptions that the leading nations will adopt reasonable policies regarding tariffs and finance and that our manufacturers and merchants will achieve such reorganization as is necessary, a larger share of a larger world trade should be within our reach.

APPENDIX.

TABLE I.

Retained Imports, 1924–31.

Particulars		1924	1925	1926	1927	1928	1929	1930	1931
		£ Mill	Per cent of 1924						
I *Food, Drink, and Tobacco*									
A Grain and Flour	Volume	118.3	80.8	81.0	93.9	81.1	88.9	87.8	102.3
	Value		113.4	103.0	99.3	96.0	89.5	68.5	45.3
B Feeding stuffs for Animals	Volume	8.6	101.2	91.1	101.1	100.9	108.5	92.0	107.5
	Value		100.3	81.1	87.1	101.1	99.6	69.7	55.8
C, D Meat and Animals, living for Food	Volume	124.2	98.0	96.0	98.0	98.1	96.7	105.5	111.8
	Value		111.4	106.6	91.6	107.9	105.3	96.8	75.3
E, F Other Food and Drink	Volume	274.4	105.8	105.7	106.5	108.6	113.4	113.1	120.6
	Value		93.3	88.3	89.8	87.8	81.1	81.1	71.1
G Tobacco	Volume	15.8	100.0	113.0	127.5	121.6	136.1	131.2	110.1
	Value		92.9	94.8	95.6	86.1	82.7	71.5	62.1
Total, Class I	Volume	511.3	98.3	97.5	102.1	101.1	101.7	105.8	111.3
	Value		101.1	95.2	92.5	92.0	90.0	78.7	66.0
II *Raw Materials and Articles mainly Unmanufactured*									
B Non-metallic Mining Products, etc	Volume	5.2	101.1	103.1	116.1	100.2	107.1	102.5	79.1
	Value		91.1	94.3	94.7	97.6	97.9	91.8	89.9
C Iron Ore and Scrap	Volume	8.5	61.9	35.0	70.9	60.3	77.1	61.1	32.5
	Value		96.9	93.6	94.1	93.7	97.8	91.0	81.7
D Non-ferrous Ores and Scrap	Volume	11.9	102.6	90.8	97.0	117.5	128.9	115.7	95.2
	Value		105.6	109.6	107.5	93.5	86.1	69.8	49.9
E Wood and Timber	Volume	50.1	99.5	87.1	109.9	91.5	103.9	102.0	83.7
	Value		91.4	87.7	88.4	87.8	86.2	82.1	68.1
F Raw Cotton and Cotton Waste	Volume	110.0	122.3	110.4	99.2	100.7	102.1	80.1	71.1
	Value		85.1	62.3	55.7	69.0	61.5	47.1	31.6
G Wool, Raw, etc	Volume	43.1	94.6	111.1	114.9	105.2	113.5	115.2	137.0
	Value		106.9	79.0	73.1	80.1	77.1	56.7	40.1
H Silk, Raw, etc	Volume	1.7	97.6	101.8	116.0	116.7	117.3	136.1	167.0
	Value		91.0	105.0	90.0	71.7	75.3	61.8	43.1
I Other Textile Materials	Volume	13.6	91.8	79.1	119.3	96.9	110.0	85.5	83.9
	Value		126.4	108.5	91.5	98.0	91.9	75.8	51.0
J Oil Seeds and Nuts, etc	Volume	18.1	105.7	98.0	100.1	102.2	106.5	95.2	99.8
	Value		101.7	90.5	87.9	85.3	81.1	70.1	50.3
K Hides and Skins, undressed	Volume	8.2	88.2	76.0	107.3	107.5	109.8	101.0	69.5
	Value		103.5	101.1	96.7	122.8	85.3	75.5	56.9
L Paper-making Materials	Volume	11.5	99.8	106.6	117.1	103.6	133.8	121.1	116.2
	Value		96.2	97.2	91.7	85.0	85.1	81.2	71.3
M, N Rubber and Miscellaneous Materials including Coal (A)	Volume	8.0	125.0	101.5	307.9	129.3	330.1	310.5	308.8
	Value		161.0	111.7	109.5	89.1	83.6	62.7	43.9
Total, Class II	Volume	323.8	106.7	119.0	113.0	101.3	112.8	101.0	91.1
	Value		96.8	81.9	76.2	81.8	78.1	61.9	48.1
III *Articles wholly or mainly Manufactured*									
B Pottery, Glass, Abrasives, etc	Volume	8.5	117.4	115.0	151.8	113.8	111.2	112.1	137.0
	Value		98.4	91.4	90.2	87.5	90.5	88.6	81.3
C Iron and Steel and Manufactures thereof	Volume	22.0	117.7	155.5	187.8	138.8	138.6	133.1	126.5
	Value		91.3	85.5	81.7	78.1	80.1	78.5	69.9
D Non-ferrous Metals and Manufactures thereof	Volume	29.0	115.7	120.6	121.8	121.1	123.1	127.6	129.1
	Value		101.2	95.8	83.2	81.9	91.1	71.8	53.1
E Cutlery, Hardware, Implements, and Instruments	Volume	6.3	127.5	79.6	96.6	102.2	111.1	113.2	120.6
	Value		104.2	105.1	100.2	93.7	98.1	89.5	82.3
F. Electrical Goods and Apparatus	Volume	3.2	131.5	116.1	132.3	158.6	212.3	272.3	263.3
	Value		95.8	96.1	96.5	81.2	80.8	71.7	71.0
G. Machinery	Volume	9.3	117.1	129.5	164.1	167.8	193.7	171.6	153.9
	Value		94.9	94.4	92.9	96.8	97.3	102.6	98.8

TABLE I (*contd.*).

Particulars		1924	1925	1926	1927	1928	1929	1930	1931
		£ Mill.	Per cent of 1924						
III. *Articles wholly or mainly Manufactured* (contd.)									
H. Manufactures of Wood and Timber	Volume	1.9	127.9	115.3	160.3	184.8	211.2	203.9	210.0
	Value		91.3	88.1	86.1	89.2	86.1	81.3	68.7
I. Cotton Yarns and Manufactures	Volume	6.7	121.7	152.5	177.3	195.1	198.3	193.8	196.2
	Value		98.1	89.0	76.3	75.3	75.8	69.7	65.0
J. Woollen and Worsted Yarns and Manufactures	Volume	12.8	106.9	111.1	123.0	123.9	126.0	131.9	157.0
	Value		95.2	89.7	81.6	92.8	86.1	75.0	61.7
K. Silk and Silk Manufactures	Volume	21.2	119.5	93.9	90.5	80.8	73.5	76.1	64.1
	Value		79.9	76.5	75.3	76.2	75.7	62.6	49.8
L. Manufactures of Other Textile Materials	Volume	14.1	101.7	92.0	121.6	118.9	123.9	98.1	116.6
	Value		107.9	98.1	93.5	81.2	84.7	94.6	81.7
M. Apparel	Volume	17.5	114.0	108.9	118.7	124.7	128.1	136.0	158.4
	Value		97.5	84.0	83.9	83.5	83.3	75.7	67.5
N. Chemicals, Drugs, Dyes, and Colours	Volume	13.3	102.7	113.9	111.4	111.5	132.3	106.5	108.5
	Value		96.9	95.9	95.4	97.1	90.7	89.4	88.1
O. Oils, Fats, and Resins, Manufactured	Volume	35.5	94.8	126.6	127.2	119.9	152.7	179.4	172.0
	Value		98.0	93.6	81.8	67.1	72.9	68.2	45.1
P. Leather and Manufactures thereof	Volume	12.6	97.6	91.3	106.4	112.0	91.7	97.9	101.9
	Value		104.9	105.9	109.4	122.2	117.7	108.3	91.5
Q. Paper and Cardboard	Volume	11.2	106.9	118.6	131.1	115.4	155.6	158.0	159.1
	Value		97.8	92.2	86.7	82.4	80.3	79.1	72.0
R. Vehicles (including Locomotives, Ships, and Aircraft)	Volume	10.6	116.4	118.9	122.4	91.0	116.3	66.9	37.8
	Value		91.2	91.1	89.3	87.6	81.9	87.3	91.6
S. Rubber Manufactures	Volume	1.8				193.8	284.6	313.7	322.1
	Value					89.7	69.1	60.3	56.1
T. Miscellaneous Articles wholly or mainly Manufactured (including Coke, etc. (A))	Volume	22.5	115.0	132.5	129.9	153.6	135.5	135.9	157.1
	Value		99.3	88.5	90.1	92.1	91.0	82.6	72.1
Total, Class III	Volume	266.0	112.2	119.5	128.1	123.7	135.3	135.6	139.1
	Value		96.5	91.1	86.7	81.6	81.8	78.5	66.6
IV. *Animals, not for Food*	Volume	2.1	69.7	60.1	77.8	77.8	76.7	95.3	99.5
	Value		132.1	110.5	135.7	150.6	167.1	131.4	116.3
V. *Parcel Post* (non dutiable articles)	Volume	1.0	97.4	69.7	86.1	95.5	81.3	78.3	71.9
	Value		Figures would have no significance						
Grand total Retained Imports	Volume	1137.5	103.9	105.6	111.2	107.8	111.0	111.3	111.6
	Value		98.8	90.1	86.6	87.7	85.7	75.6	61.2

Notes

1. Food, etc. Groups E and F have been combined for convenient comparison with exports. It has also been convenient to take C and D together.
2. Raw Materials. Rubber and Miscellaneous Materials have been combined, as re-exports of rubber were in excess of imports in 1924. Coal has been added to the Miscellaneous group, as it was only of importance in 1926 and 1927.
3. Manufactures. Vehicles and Rubber Manufactures are taken together in 1925–7, as rubber tyres were then included in Rubber Manufactures; they were afterwards transferred to Vehicles.
4. Parcel Post. The Values are conventional and are adjusted from time to time.

TABLE II

British Exports, 1924–31

Particulars		1924	1925	1926	1927	1928	1929	1930	1931
		£ Mill	Per cent of 1924						
I *Food, Drink, and Tobacco*									
A Grain and Flour	Volume	7.5	102.9	70.1	72.8	72.9	70.5	67.8	74.0
	Value		118.3	110.5	103.3	98.5	92.2	81.4	58.7
B Feeding-stuffs for Animals	Volume	3.1	96.7	84.1	100.6	106.0	91.0	73.1	85.7
	Value		103.5	92.6	95.7	102.1	106.3	96.1	79.0
C, D Meat and Animals, living, for Food	Volume	1.9	95.8	91.1	97.9	96.8	98.7	87.9	81.3
	Value		104.5	103.9	97.9	98.5	103.1	102.8	91.2
E, F Other Food and Drink	Volume	38.0	92.1	91.0	97.7	100.6	115.6	101.1	80.5
	Value		96.6	90.9	88.5	90.0	82.5	76.3	69.2
G Tobacco	Volume	6.5	111.6	128.6	115.2	176.2	215.7	201.9	127.2
	Value		96.6	[illegible]	88.5	81.2	67.7	[illegible]	62.7
Total, Class I	Volume	[illegible]	96.3	93.7	100.5	105.8	111.5	112.2	89.7
	Value		100.2	91.9	91.4	90.0	81.8	75.6	67.0
II *Raw Materials and Articles mainly Unmanufactured*									
A Coal	Volume	72.1	82.7	33.1	82.5	80.1	96.3	87.7	68.9
	Value		81.7	79.5	76.6	67.1	70.1	72.3	69.8
B Other Non-metallic Mining and Quarry Products and the like	Volume	2.1	101.9	100.2	100.1	95.8	100	85.0	71.5
	Value		90.6	90.9	83.6	93.8	91.1	91.8	73.4
D Non-ferrous Metalliferous Ores and Scrap	Volume	1.1	117.9	212.8	206.6	213.8	[illegible]	135.1	137
	Value		65.3	53.9	51.4	60.8	70.1	42.5	25.5
E, F Raw Cotton and Cotton Waste	Volume	1.9	111.4	95.7	118.8	111.5	108.7	65.3	66.8
	Value		85.1	58.6	75.3	66.8	57.0	49.5	38.2
G Raw Wool, Waste and Rags	Volume	12.4	92.6	87.9	106.4	98.6	93.9	62.8	61.9
	Value		93.8	77.3	70.0	83.9	82.1	61.9	42.7
J Oil Seeds and Nuts, Oils, Fats, Resins and Gums	Volume	6.9	98.1	95.3	92.0	91.1	90.9	68.1	63.5
	Value		103.5	94.4	[illegible]	85.1	82.1	76.1	55.4
K Hides and Skins, undressed	Volume	2.5	86.4	81.0	91.4	97.8	86.6	76.1	61.4
	Value		131.8	115.7	110.7	126.3	122.0	75.6	57.8
L Paper-making Materials	Volume	1.9	107.5	100.0	101.6	118.4	128.0	107.9	99.1
	Value		92.4	81.1	69.6	64.3	[illegible]	51.7	36.8
N Miscellaneous Raw Materials (including Groups C, I, H, I and M)	Volume	5.3	129.9	103.0	123.0	139.6	176.7	120.7	110.1
	Value		80.3	81.1	90.0	78.7	68.7	65.0	57.8
Total, Class II	Volume	106.5	89.5	75.3	91.9	89.8	101.1	85.3	70.2
	Value		88.6	79.1	78.1	73.1	73.1	70.2	63.2
III *Articles wholly or mainly Manufactured*									
A Coke and Manufactured Fuel	Volume	6.2	83.8	32.3	80.5	93.6	106.7	89.1	81.5
	Value		73.5	67.7	73.0	62.9	63.6	63.7	58.1
B Pottery, Glass, Abrasives, etc	Volume	12.9	105.0	91.9	103.1	111.1	120.7	109.2	79.9
	Value		96.0	95.0	97.8	91.2	90.2	88.0	82.0
C Iron and Steel and Manufactures thereof	Volume	71.5	98.3	83.6	110.1	112.8	115.7	86.5	51.8
	Value		93.0	88.8	81.7	79.8	79.3	79.9	71.9
D Non-ferrous Metals and Manufactures thereof	Volume	15.7	105.7	118.9	124.3	113.1	124.6	99.1	66.5
	Value		101.8	101.8	102.2	92.5	93.7	77.1	66.6
E Cutlery, Hardware, Implements, and Instruments	Volume	8.5	103.1	97.9	105.5	[illegible]	121.1	100.7	76.6
	Value		103.8	102.1	95.2	89.7	87.0	82.5	78.9
F Electrical Goods and Apparatus	Volume	10.7	113.1	117.9	114.1	115.2	130.8	122.8	78.3
	Value		96.0	96.8	97.1	91.5	91.3	90.9	88.9
G Machinery	Volume	44.8	112.1	103.1	112.8	121.3	123.7	101.9	71.8
	Value		97.8	98.5	98.8	96.5	98.1	[illegible]	102.0
H Manufactures of Wood and Timber	Volume	2.3	109.8	103.1	111.2	122.6	117.1	117.0	89.7
	Value		91.1	89.8	88.7	89.2	88.3	82.7	69.1

TABLE II (*contd.*).

Particulars		1924	1925	1926	1927	1928	1929	1930	1931
		£ Mill	Per cent of 1924						
III *Articles wholly or mainly Manufactured* (contd.)									
I Cotton Yarn and Manufactures	Volume	199 2	102 3	90 1	98 1	91 8	88 1	62 5	49 [illegible]
	Value		97 8	86 0	76 1	79 4	77 0	70 1	57 [illegible]
J Woollen and Worsted Yarns and Manufactures	Volume	67 8	82 0	75 0	81 5	82 3	77 0	58 1	46 1
	Value		106 1	101 1	93 1	102 0	101 3	93 8	80 5
K Silk and Silk Manufactures	Volume	2 2	91 2	96 7	112 6	116 9	126 5	101 1	87 3
	Value		92 1	92 5	77 9	71 9	78 1	68 1	51 3
L Manufactures of Other Textile Materials	Volume	27 5	91 6	95 4	112 2	131 7	129 7	105 1	87 9
	Value		110 6	101 9	87 6	81 3	75 2	67 6	53 3
M Apparel	Volume	30 0	98 1	95 8	95 1	95 6	93 9	77 7	63 8
	Value		98 0	91 8	90 0	91 1	90 8	81 7	73 1
N Chemicals, Drugs, Dyes and Colours	Volume	25 5	95 4	90 8	102 6	117 5	129 7	113 0	91 9
	Value		97 0	92 3	89 5	84 9	80 5	76 3	70 5
O Oils, Fats, and Resins, Manufactured	Volume	8 9	117 3	109 1	110 8	117 3	112 9	102 4	87 4
	Value		97 7	97 0	91 9	85 6	85 4	81 1	67 6
P Leather and Manufactures thereof	Volume	7 1	93 6	91 3	118 0	112 5	104 1	71 1	51 2
	Value		106 6	103 3	99 9	117 2	106 9	101 2	91 1
Q Paper and Cardboard	Volume	9 2	109 6	106 8	101 2	108 7	113 8	102 8	81 3
	Value		97 2	99 6	98 0	92 6	88 7	89 3	81 3
R Vehicles (including Locomotives, Ships, and Aircraft)	Volume	29 7	130 1	126 2	132 1	184 5	206 1	208 3	12[illegible] 4
	Value		93 8	92 1	88 6	85 9	82 2	82 1	75 1
S Rubber Manufactures	Volume	3 3				120 1	129 0	118 2	107 6
	Value					85 1	78 8	71 6	59 1
T Miscellaneous Articles wholly or mainly Manufactured	Volume	32 9	106 0	106 1	115 1	123 9	132 1	105 5	86 5
	Value		98 8	96 9	95 6	93 3	91 [illegible]	87 8	79 5
Total, Class III	Volume	618 9	101 5	91 2	101 4	107 9	109 3	87 7	65 2
	Value		98 [illegible]	92 8	87 3	86 7	81 8	81 2	72 3
IV *Animals, not for Food*	Volume	2 3	64 9	44 7	56 9	56 7	53 9	49 8	39 8
	Value		153 3	167 1	115 1	153 0	163 3	131 3	110 1
V *Parcel Post*	Volume	16 3	95 1	76 1	103 1	83 2	85 7	78 3	69 1
	Value		Figures would have no significance						
Grand Total British Exports	Volume	801 0	99 2	88 9	102 3	101 7	108 3	88 7	67 6
	Value		97 3	91 7	86 5	86 3	81 1	80 3	71 8

Notes

1 Food, etc. For the sake of convenience groups C and D have been taken together.

2 Raw Materials. In order to save space a number of small groups have been combined with Miscellaneous Materials.

3 Manufactures. Vehicles (R) and Rubber Manufactures (S) have been combined for 1925–7, as in those years rubber tyres and tubes were classed with Rubber Manufactures; afterwards they were transferred to Vehicles.

4 Parcel Post. The Values are conventional and are adjusted from time to time.

DISCUSSION ON MR. MACROSTY'S PAPER.

SIR WILLIAM BEVERIDGE: It gives me great pleasure, for more reasons than one, to have the privilege of moving this vote of thanks to Mr. Macrosty. I may perhaps begin with the personal reason. This is not the first lecture by Mr. Macrosty to which I have listened; I sat under him when I was a student at the London School of Economics and he was a lecturer on the staff there, twenty years ago. I learned from him about the coal and iron trade—in fact, the foundations of such knowledge as I possess on this subject I derived from the mouth of Mr. Macrosty. It has therefore been a great pleasure to listen to another lecture by him. I have had other connexions with Mr. Macrosty. I followed him into the Board of Trade, and preceded him out of it.

As to this present paper, of course it contains a mass of invaluable information which we shall all take away with us and profit by. I cannot pretend to have exhausted a quarter or even a tenth of what I hope to get out of it in the future.

I am going to ask three small questions at the beginning, merely to clear up points of detail, and one more general question.

I was a little confused by Mr. Macrosty's statement on p. 616, that "up to 1931, production, both in general and of manufactured goods, increased more rapidly than population and also more rapidly than general exports." Is 1931 included or excluded here? Another thing that slightly confused me on first reading was that I did not realize at once that in Table I. p. 609 "values" meant average values—in effect, price.

On p. 612 Mr. Macrosty mentions that "the increase in the retained imports of articles wholly or mainly manufactured between 1924 and 1929 is almost the most important and to some extent the most alarming feature of the period." I found a certain difficulty in reconciling that with the robust free-trade doctrine of his later statement, where he refers with approval to the old adage that "if you will not buy you cannot sell." It may be that he regards increase in imports as alarming because it meant that by not balancing our trade we were putting the rate of our exchange into jeopardy, but I did find a certain difficulty in reconciling that with what Mr. Macrosty said subsequently, with which I personally agree that if the nations will go on destroying one another's trade, they will get the kind of results shown in the tables given on pp. 619 and 621.

I should now like to put my main and most important question, with which I hope Mr. Macrosty will deal in his reply. To what extent are our difficulties due to world poverty, to world folly, or to our own inefficiency, respectively? To some extent, no doubt, each of these three factors is responsible. Owing to some financial breakdown, the world is in a state of depression, and we, as a great trading country, suffer from that depression; that is world poverty. Again, every nation tries to get out of its difficulty by hurting some other nation; that is world folly. Again, we seem to have lost trade relatively to other countries; that may be a sign of relative inefficiency. I do not express any views on these particular things; I imagine that in so far as we can attribute to ourselves relative inefficiency, it is due to the fact that we do not change quite quickly enough from the old trades to the new trades which should be developed. A point of particular interest to me was that brought out in the paper of the simultaneous increase of imports of manufactured goods and exports of the same kind of manufactured goods—as in the case of electrical apparatus. I suppose it is generally true that the use of electrical goods is a thing that has increased enormously in the whole world, and is still growing; our overseas trade should have grown in this direction. The more we can move over to these trades from the older staple trades, the more we shall hold our share in the trade of the world.

In making these remarks I do not intend them to be in the nature of criticism, but merely hope to assist in elucidating this admirable paper still further. When Mr. Macrosty began his address this evening I wondered whether he was going to apply to himself Disraeli's saying about a speech he had listened to: "Many things in it are new; many are true, but the new things are not true, and the true things are not new." I am glad Mr. Macrosty did not apply that saying to himself, for it would have been ludicrously untrue of his own paper. There were many things that were true in the paper, and whether they were new or not, they have been put before us with freshness and admirable sincerity. I should like to congratulate Mr. Macrosty on his paper, and the Society on their good fortune in getting it. Perhaps also I ought to congratulate Mr. Macrosty in being in time to read a paper on overseas trade before such trade disappears altogether.

MR. A. R. BURNETT-HURST: I have very great pleasure in seconding the vote of thanks to Mr. Macrosty. When Mr. Macrosty handed me his paper, he told me that I would find it dull and dry. I differ from that opinion. I think you will agree that the paper is intensely interesting, and full of valuable material for the politician, the economist, and the Press. It is a valuable collection of official statistics, handled with care. At times the author lets himself go, as, for example, on p. 622, where he said that "want of confidence in the economic situation has spread through Europe like a plague, and the sight of the United States flung out of her artificial, paper-valued, instalment-bought prosperity into a trough of the deepest depression has made all countries try at whatever hazards to conserve their funds." I am sure we appreciate these "purple" passages just as much as we do the dry-as-dust facts.

On a paper with which I find myself so much in agreement, I do not intend to offer any serious criticisms. I merely propose to draw attention to one or two subjects. It seems to me that the paper centres around two main features: the world crisis and Britain's share of the world trade.

With regard to the world crisis, Mr. Macrosty states on p. 622 that France and the United States have "compromised the whole economic structure of the world by demanding payment of war debts and reparations and refusing to take payment in goods." Since the solution of the world's difficulties as outlined on pp. 622-23 will depend largely upon international harmony, the less said about the causes the better, and the more necessary is it for all to concentrate upon creating a spirit of goodwill in order to bring about combined international action.

With regard to Britain's share of world trade, it would be very interesting if we could ascertain how much the shrinkage in world trade is due to the fall in prices, and how much it is in fact shrinking. I quite realize the difficulties of making this analysis, but it is worth considering whether a rough estimate could not be made on the basis of the trade returns of the principal foreign countries.

The Table of World Trade on p. 621 does not show the gravity of Great Britain's position as it would do if the figures had been taken back a little further. Mr. Loveday, in a review of international statistics, has brought out the fact that the share of the United Kingdom in the world's exports by value was, in 1913, 13·94, but he goes on to say that from 1924 onwards there has been a progressive decline, and that I feel is the danger of our position at the present time. It is not a sudden fall, as in the case of most countries, but it is a continuous and progressive decline. Mr. Macrosty does not discuss the reasons for the decline, but in the course of his paper he indicates, here and there, some of the probable causes. On p. 635, referring to Group III. E. of the Import and Export list which includes commodities in which precedence must be yielded to the foreigner, he says that, "broadly speaking, there is a contest between price and quality, British goods being the better and dearer." While that statement is quite true, it is also applicable to many other of the categories. That is one of the chief reasons why Great Britain has been unable to retain her position in the export trade. We cannot hold our position because our costs of production are far too high; this is found to be the case in cotton and many other products. An indication of another cause of the decline of Britain's share of the trade is given on p. 633, where a reference is made to the foreign competitor having got a footing in the iron and steel trade, owing to our industrial troubles. Those of us who have been resident abroad realize how far foreign competitors have taken advantage of industrial troubles, lock-outs, and strikes in this country. These interferences with trade have enabled our competitors to secure a foothold in various trades and to extend their activities.

A further cause of Britain's declining trade is undoubtedly the maladjustment between wages and decreasing prices. This is brought out clearly by Mr. Macrosty on p. 615. He does not say it is one of the causes; he states the facts and leaves it to us to draw the conclusion. He points out that the fall in prices "has reduced the cost of living from 75 per cent. over 1914 in 1924 to 64 per cent. in 1929 and to 48 per cent. at the end of 1931." On the other hand, he states that "the average level of the rates of wages in 1924 and up to 1930 was from 70 to 75 per cent. above that of July, 1914; the improvement in the condition of persons in employment is manifest." In other words, there has been a definite rise in real wages in this country at a time when we should have endeavoured as far as possible to adjust money wages to the fall in prices in order to have maintained real wages at the same level.

The sections on individual industries are of particular interest. I am not going to enter into a controversy with regard to the future of the cotton trade. Although I feel that Mr. Macrosty has drawn a red herring across my path, I shall content myself by saying that I do not agree that Lancashire is likely to recover the position in India which she held in 1927.

With regard to the motor trade, while it is true that British skill has resulted in our securing a considerable hold of overseas markets, I am of opinion that Great Britain could have achieved a greater degree of success and our progress would have been more rapid if there had been improved salesmanship. This remark applies not only to the motor trade, but also to the sale of such articles as typewriters. In India there is great difficulty in getting the spare parts of British cars, typewriters, etc. Frequently it is impossible to get spares for British machines, whereas the American manufacturers see that the spares are available. Our exporters must deal with this problem if they wish to secure a greater share of the overseas market.

With regard to shipbuilding, is it not a fact that one of the reasons why Great Britain is not holding her position in the shipbuilding industry is because this country, as compared with Germany and Italy, has been very slow in taking up the motor ship; also, have not our costs been much higher than those of our competitors? I think these are among the factors that have affected our position in the shipbuilding industry.

In conclusion, I should like to say that it would be an excellent thing if the Society could have periodical reviews on similar lines from Mr. Macrosty. Now that Mr. Macrosty has been relieved of his official duties at the Board of Trade, I hope he will be able to give even more of his valuable time to the Society than he has given in the past. I have much pleasure in seconding the vote of thanks.

SIR JOSIAH STAMP said he wished to endorse all that had been said by the proposer and seconder of the vote of thanks. By no means the least of the great services that Mr. Macrosty had rendered to the Society was the presentation of these thorough and able series of studies There was substance here for the study of many of the problems close to the minds and hearts of Fellows of the Society. For example, it was possible to examine more closely here than it had been before, in the compass of a single series of figures, the changes in cost of living and the direction of the re-distribution of purchasing power on the part of large masses of the people. If the working classes had been placed in the possession of much greater purchasing power, they certainly had not spent it in the same directions; in what directions had they spent it, and had they added to the difficulties of the nation? In studying the various categories now provided by Mr. Macrosty it was possible to get much nearer to the truth than by the study of a general analysis.

It was also now made easier to tackle the very important problem of how far the increased real wage that had been enjoyed in the last three or four years, compared with the pre-war period, could be justified by the increased efficiency of machinery and production generally.

If the whole of that balance were assigned to the purpose of creating an additional wage fund, after providing interest on the additional capital how far would that be adequate to provide the real wage that has in fact been paid? Mr. Macrosty's paper would furnish some of the material required to review or question some of the rather facile conclusions published recently. Certain figures had been put forward to show that there had been an increased productivity per person, but many people had great doubt as to whether that was really a valid deduction. This matter could now be studied more closely.

There was another matter on which Mr. Macrosty had been almost silent—the connection of these figures, particularly of imports, with foreign finance. There was an enormous sum of money due to Great Britain from abroad. In the past the habit had been to leave most of the interest abroad as new foreign investments. As time went on these resources had been drawn upon for food and other purposes, until practically the whole had disappeared. Last year the balance had been on the other side. There must be some connection between the figures given in the paper and investment of funds abroad.

On pp. 621–23 Mr. Macrosty gave a most graphic section—a kind of Athanasian Creed. In that section were packed perhaps more concentrated reasons for what had happened than were to be found anywhere else in similar compass, and inasmuch as this was almost certain to be a classic quotation in fifty years' time, Mr. Macrosty would be well advised to scrutinize it very carefully to see that he had included every item of his belief.

Sir Josiah said that he missed one thing in the paper: there was no reference to the relative "rigidities" of the industrial structure of the country—to use a common new word that relative reluctance to alter wage levels that was understood to make Great Britain turn round more slowly than other countries. How far that was responsible for much of the country's relative difficulty in world trade, he did not intend to discuss now, but he threw it out as being probably the only conspicuous item omitted from Mr. Macrosty's astonishing recital, otherwise so complete. He echoed the wish of the last speaker, that Mr. Macrosty might live to a ripe old age, and provide the Society with many such reviews.

Mr. H. Leak said that as an old colleague of Mr. Macrosty's he would like to congratulate him upon the use made of the statistics which the Board of Trade were in the habit of providing monthly, quarterly and annually. The survey was an admirable one, and he would like in particular to stress what was said on p. 626 about the importance of only applying the price figures to trade with all countries in the aggregate, and not to the trade with individual countries. A number of people seemed to think that the price factor must be the same for the trade with each country, but anyone who gave thought to the matter knew that it was not so.

The Board of Trade index numbers for the volume and value of our overseas trade were not compiled by the chain method. It was not considered that the index numbers went on and on from year to year, from base to base. Each index stood on its own footing, and the present index based on 1930 should only be read as relating to 1924 and to 1930 and subsequent years. Then there was an index based on 1924, with a comparison between 1924 and 1913, and so on.

On p. 620 Mr. Macrosty referred to the percentage of our exports going to Japan falling from 3·33 in 1924 to 1·58 in 1931. The figure 3·33 was rather a bad one to take; it was much less in 1923 and 1925, and the reason for it being 3·33 was due to the Japanese earthquake in 1923 which led to Japan requiring much larger quantities of goods from this country than in other years.

Mr. Leak said he had been much interested in the relation of trade and shipping as set out in pp. 617–19. It would, however, add to the significance of the figures if, in respect of exports, there had been some discrimination between coal and other goods. The Liverpool Steamship Owners' Association made some calculations on the basis of 200 tons of coal carried in 100 tons net of shipping. Mr. Leak thought that figure was too low, and he would make it more nearly 240 tons of coal to each 100 tons of shipping. The only year in which there was any considerable discrepancy, according to the conversion factor used, in the index for shipping tonnage relative to 1924, was 1926, when, owing to the small amount of coal exported, the Liverpool Shipping Association's factor gave an index of 107, whereas Mr. Leak's gave 240.

It should be pointed out that the volume of exports and imports as calculated by the Board of Trade did not represent either the physical volume of the goods or their weight; it was a quantity basis, and it could be said at once that there might be considerable changes in the physical volume or quantity without really affecting the volume of trade which was passing. If that were borne in mind, the volume of trade might be compared with that of shipping, as was done in the paper. The results of Mr. Macrosty's analysis were not confirmed by the figures if coal was eliminated. The shipping index relative to 1924 was greater in each year than the volume of export index. The figures were as follows (1924 = 100) :—

	Volume of exports, excluding coal.	Net tonnage of shipping, excluding colliers.
1925	100·5	104
1926	93	97
1927	102	106
1928	104	110
1929	105·5	110

Until 1928 there was an increasing divergence in favour of shipping; Mr. Macrosty found a divergence in the opposite direction. In 1929 the gap narrowed, which was to be expected, because 1929 was a year of relatively good trade, so that one would expect to find an increase of exports in relation to shipping. In the two succeeding years there was a large falling off in exports and some decrease in shipping, but for 1931 the shipping index is still above the 1924 level, a fact not perhaps without interest.

In the last part of this section Mr. Macrosty had made some calculations, and Mr. Leak had done the same sort of thing, but had arrived at a different result. Gross shipping earnings in 1929, apart from passenger traffic, seemed on this basis to have been £15 or £16 million less than in 1924. The actual net shipping earnings calculated by the Chamber of Shipping for that year were £120 million, which was £35 million less than the gross shipping earnings calculated by the Board of Trade for 1924. Making allowances for disbursements, etc., there was substantial agreement between the two sets of figures. There were two points about the calculation that he wished to make. First, shipping earnings were calculated on the whole earnings of British shipping, not only on the earnings in respect of the carriage of goods to and from this country. Secondly, the application of the Chamber of Shipping freight index to exports from this country was hardly justified, owing to its being largely weighted, perhaps overweighted, by grain freights.

Professor Jevons said that Mr. Macrosty's paper had covered such a wide range that one must congratulate him upon the tremendous amount of work done. If he referred to details here and there, it was not with any intention of criticism. He thought Mr. Macrosty had been a little too optimistic as regards the probable recovery of British foreign trade, in not taking sufficient account of the possibilities of the expansion of Japanese trade. The more he had seen of Japanese goods in the East and their great improvement in quality in the years since the War, and considered also the figures which showed the expansion of Japanese trade in the markets of the East and of Africa, the more afraid he felt of the effect of their future competition with European goods generally. The Japanese were technical masters already in many trades, and were becoming more and more so. They possessed very high technical skill and had learnt largely from the Germans. It was probable that there would be a great extension of Japanese trade in the next thirty years. With the low standard of living of the Japanese, and their low costs of production, this presented a bad look-out for England.

With regard to the coal industry, Mr. Macrosty felt that so much had been said on the subject that he would pass it over in the present survey. It would have been interesting to discuss the coal trade, however, if the Board of Trade in their official statistics had shown exactly what was taking place in regard to changes in the quality of coal exports. When export figures were studied it was usually found that the division of certain types of goods was carried to great detail, but in the case of coal, many qualities were lumped together. True large and small coal were distinguished from "through and through" as well as coke and patent fuel. There were many different kinds of coal as regards composition, and there was an increasing demand for washed coal. There was also an important change beginning, which ought to benefit exports considerably, viz., the use of the standard specification. In 1930 the British Engineering Standards Association prepared a standard form of specification and method of testing coal, so that exporters could do what exporters of other countries had done for many years. It would be very interesting in future if the export figures were to show how much of the coal that left Great Britain was sold under this standard guarantee, under standard specification. If such figures were required by the Board of Trade, it would perhaps encourage exporters to adopt this system to a greater extent.

On p. 639 it was mentioned that the trade in tiles was dependent upon building schemes and the importation from France, Belgium and the Netherlands was probably for use in the south of England, the chief factor being cheap sea transport. In 1930 he (the speaker) had had a conversation with a builder's merchant who did a considerable trade for housebuilding, and he had said, amongst other things, that a few years previously considerable quantities of British tiles were exported to Belgium and brought back again, because they could be purchased by English merchants in Belgium at about half the price at which they were sold in England according to the terms of the price association.

Mr. Brace supported the resolution of thanks to Mr. Macrosty, his sometime chief at the Board of Trade. Many of the figures contained in the paper were familiar to him, but he would like to raise a question with regard to the statement that there was a surplus of shipping capacity at the present time. Undoubtedly the trade of the country had shown a decline in recent years, but there had also been a great decline in shipbuilding, and this industry was experiencing bad times at the moment. He himself was in correspondence with a senior officer of the Cunard line, one of whose recent letters showed the effect of the new tariff policy. He had mentioned that whereas their normal freightage consisted of 10,000 tons in his particular ship, it had dropped to 1,500 tons, and there was every prospect of it being even lower in the future. From that it would appear that regard must be given to the effect of the decline in the shipping industry of the country upon the home industries, particularly the heavy industries. The shipbuilding industry was a great customer of these trades, and if the effect of the tariff policy was to be a considerable decline in the shipbuilding industry, it would surely have an adverse effect upon the production of other commodities. It would therefore appear that considerable reductions in these figures of volume, so ably put before the Society that evening by Mr. Macrosty, might still have to be faced.

Mr. Norman Crump expressed pleasure in once again being associated with a vote of thanks to Mr. Macrosty; it was not the first time, and he felt sure it would not be the last, and each time the duty became even more pleasant than on the last occasion.

It gave him particular pleasure to-day, as he felt he was now in a position to put to Mr. Macrosty a question which had been worrying him for ten years—a question which seven years previously he had put to his friend, Professor Irving Fisher. It concerned the measurement of changes in the volume of overseas trade, whether imports or exports. Mr. Crump felt very doubtful whether Mr. Macrosty could measure changes in the volume at all, or whether the figures for which he had been partly responsible, and which appeared in the *Board of Trade Journal* at regular intervals, really meant what they were said to mean, or whether they meant anything at all? Perhaps he might lead up to this question by recalling that it was impossible to add together the weights of different articles in the foreign trade such as 3 tons of coal, 3 tons of diamonds and 2 tons of elephants and get a result of any worth. It was even impossible to add together the various components of machinery exports; still less could the total weight of iron and steel imports and exports be subtracted the one from the other, and the answer quoted on public platforms as possessing some significance, as was frequently done. One thing the paper had made clear was that the imports of iron and steel were totally different from exports of iron and steel, therefore the one could not be subtracted from the other, and any result of any meaning be obtained.

Taking the year 1930, the value of trade in that year could be expressed as follows:

$$\Sigma p_0 q_0$$

p_0 being the price of each item in that year and q_0 its quantity imported or exported. Similarly, in the year 1931 32 the total value of trade, whether imports or exports, would be:

$$\Sigma p_1 q_1,$$

p_1 being equal to current prices, and q_1 current quantities, item by item. To quote the explanation given in the *Board of Trade Journal*, the procedure for calculating changes in the volume or average price of imports or exports is first to re-value the current year's quantities at the base year's prices. This is expressed by the symbols

$$\Sigma p_0 q_1$$

The price index is then:

$$\frac{\Sigma p_1 q_1}{\Sigma p_0 q_1}$$

and the volume index is:

$$\frac{\Sigma p_0 q_1}{\Sigma p_0 q_0}$$

Now the formula for the price index is perfectly rational, but with regard to the quantity index number, Mr. Crump said that the question he had put to Professor Fisher, and which he now put to Mr. Macrosty, was: What justification was there for using prices as weights for a volume index number? What connection had the price of each article of foreign trade—whether to-day, yesterday or ten years ago—with a mathematical calculation of changes in the total volume of trade? Mr. Crump hoped that Mr. Macrosty would be able to give him a more convincing answer to this question than Professor Fisher had done.

MR. VIBART said he would like to venture a reply to the quotation which Mr. Macrosty had made (on p. 634) from Sir John Hunter's speech last March, and which Mr. Macrosty said still awaited an answer. Sir John Hunter said:

> " The price of steel is the same to-day as it was in December 1929. I find the price of heavy steel scrap in 1929 was 72*s.* 6*d.* per ton and is now 37*s.* 6*d.* per ton."

Quoted in close relation to Mr. Macrosty's statement as to the importance of importing foreign steel Sir John Hunter's statement was a very damaging one, because, on the face of it, it would appear that while the principal materials cost had gone down very substantially, the selling price of steel had not been reduced at all. Probably in its context it was not so misleading; it might have referred to particular limited classes of building steel, tees, angles, etc., but in relation to the whole range of steel it was certainly not true. In the first place, the difference shown was an extreme one, as in December 1929 72*s.* 6*d.* was a high price, whilst 37*s.* 6*d.* last March was considerably below the market price in many districts. A reasonable average difference for scrap would be about 30*s.*, representing a reduction in the cost of steel of say about one pound at the outside and less in many districts, where the proportion of scrap used was not so high. Examination of market prices at these two periods would show that prices for almost all forms of semi-finished steel fell by anything from 15*s.* to 30*s.* a ton, *e.g.*

	1929.			1932.		
	£	*s.*	*d.*	£	*s.*	*d.*
Billets	6	10	0	5	10	0
Tinplate Bars	6	5	0	4	15	0
Wire Rods	8	10	0	7	10	0

It was therefore not true to say that while the price of materials had fallen, the price of steel had remained the same.

With regard to the statement that the galvanized steel trade had been " largely built up on cheap imported steel," Mr. Vibart did not think that this was quite a fair statement of the position, especially when it was remembered that in 1913 the exports of galvanized sheets, tin plates, and other sheets were roughly 1400 thousand tons, whereas the imports of sheet and tin-plate bars amounted to only 345 thousand tons. It was true, of course, that during recent years the import of sheet bars had represented a very substantial proportion of the exports of galvanized sheets, but it was interesting to notice that exports had declined during the last two years just at the time when imports of foreign steel had been increasing. Mr. Vibart therefore suggested the need of great caution in drawing inferences from the figures suggesting the importance of continental steel in relation to the export trade. It was possible to over-estimate the effect of the general strike conditions. Exports after the general strike, and until the recent depression, were in many cases larger than in the years preceding 1926.

In conclusion, Mr. Vibart thanked Mr. Macrosty for his valuable paper and for the astonishing range of the subject-matter dealt with, which made one feel ungrateful in fastening on one special paragraph for criticism.

Mr. Macrosty: It gratifies me very much that my paper should have received your approval. There are one or two points in the discussion to which I would like to refer now.

With regard to Mr. Vibart's remarks on galvanized sheets, I think his objection is to the use of the phrase "built up," and not to my pointing out that imported sheet bars do as a matter of fact constitute a very large proportion of our export trade in finished sheets. If that is so I will try to substitute a less contentious phrase than "built up." My quotation from Sir John Hunter's speech was not wilfully torn out of its context; it stands there as a statement made by him with particular reference to the influence of price combinations in the iron and steel trade, and I am bound to say that I have a good deal of sympathy with him, as my study of the iron and steel trade probably goes back further than Mr. Vibart's. I put the quotation in for the particular purpose of soliciting an explanation from some representative of the trade, as it puzzled me very much indeed. Mr. Vibart has given such an explanation.

Mr. Crump has propounded a question impossible to answer now or in a delayed reply. But the whole of next Session is open to us. Will Mr. Crump present a paper to the Society setting forth in detail the difficulties which he finds in getting into touch with the Board of Trade calculations, and then we will have Mr. Leak and, I hope, Mr. Flux and the other authorities, and thrash the question out and have it settled once and for all?

Mr. Burnett-Hurst reproved me for troubling political waters by severe remarks on the Americans and the French. Frankly, I had no intention of being kind and gentle to them, and I do not think they would respect me for pretending an approval of a policy I condemned.

I would like to congratulate Mr. Leak on his first contribution to our debates and to hope it will be followed by many others. My contribution to the analysis of the statistics of shipping was designed rather to show the limits than to obtain exact measurements.

All the speakers have been far too kind to me, and I could not help being pleased as I noted how everyone found in my paper material to support their own economic opinions. I can at least hope that I have been impartial, and, therefore, I resist Sir William Beveridge's attempt to drag me into the fiscal controversy. I shall make clear the point about production in 1931, but I cannot venture to discuss the ultimate causes of the present discontents. World poverty, world folly, relative inefficiency in some spheres, the relative "rigidities" (to use Sir Josiah Stamp's phrase) of our economic structure—all these have played a part, but to undertake a world-wide psychological and economic analysis is impossible within the limits of my reply. I again thank the Society.

As a result of the ballot taken during the meeting, the candidates named below were unanimously elected Fellows of the Society:

Mervyn Hugh Gordon Chitts.
William James Lawson Ineson.
Arthur Reginald Shott.

Corporate Representative:

H. E. Hedges, *representing* the Great Western Railway.

INDUSTRIAL PROFITS IN THE PAST TWENTY YEARS A NEW INDEX NUMBER.

Presidential Address of SIR JOSIAH STAMP,
G.B.E., LL.D., D.Sc., F.B.A.

[Delivered to the Royal Statistical Society, June 21st, 1932.]

1. *The Economic Dynamic Profits.*

STATISTICAL examination of trade movements is the conventional basis of practical discussion of economic questions to-day, but analysis of the statistics of profits is rarely available. This is mainly due to the fact that a sequence of comparable profits is seldom obtainable, and if it is not a complete aggregate for an area or an industry, it is difficult to relate it to other economic data. In 1918 I read to the Society a paper on the *Effect of Trade Fluctuations upon Profits*, since when no attempt has been made to examine in detail the course and fluctuations of industrial profits, although the interval of time that has elapsed must prove to be one of the most interesting in economic history. For any relations between the level of prices and the level of employment about which economic analysis is now so busy and so much involved, must find their existence through the medium of profit-making, either achieved or anticipated. Throughout the world, outside Russia, the profit-making incentive occupies the position of the mainspring of the economic machine. If individuals or a group find that they can associate a mass of accumulated capital or savings with a mass of human labour, manual and mental, and produce commodities or services which can be marketed at a figure which allows a margin above the rewards necessary to evoke the supply of the agents they bring together, then they will proceed, and employment results. If they can see no margin, and cannot, in prospect, cover their costs, no employment results. Even when they are once committed to a project, the profit-making test is still dominant, although it may be retarded in action, and unemployment may not ensue for some time. So the margin of profit either brings the machine into being or determines the period of its operation. In a money economy where costs vary in their relative changeability, or their susceptibility to change, the effect of price change upon this margin is particularly far-reaching. The greater the proportion of the relatively unchangeable elements of wages, unemployment pay, taxes, interest on capital, to the total costs, the more important the effect of price changes upon the profit margin, and therefore upon employment. No amount of bureaucratic planning can in the long run overcome the necessity for producing such a surplus.

The economic theory and analysis resting upon this position is not the subject of this paper. But my intention is to assemble the available material of recent times and to ascertain what, if anything, may be gleaned therefrom, in statistical form, concerning relationship with parallel conditions of price, employment, output, etc. My first object is to attempt to construct an index of profits of the same order as the index of production, of foreign trade, and other indices progressive in time, but also comparable, after suitable elimination of trend, with the price index, the unemployment index, and similar measures of movement about a non-time norm. My second object is to glance at one or two of the more obvious uses of such an index.

2. *The Existing Data.*

The only comparable and aggregated statistics of profit are the assessments under Schedule D of the Income Tax. I would refer to the paper already mentioned and to my *British Incomes and Property* for a statement of their limitations as representations of actual commercial profits. The chief drawback in their use, as they stand, is that (1) they represent trading years ending at many different dates and (2) they are thrown into three-year averages (up to 1927–8, when the law was altered to allow of assessments upon a single " preceding year " basis). Both these facts tend to hide the sharper variations which it is our object to analyse.

But we possess a standard sample record of the quarter to quarter, or year to year, course of industrial profits in the *Economist's* periodical statement. These have here been extracted for a period of over twenty years, and are given in Table A in the Appendix. The chief limitation of the figures as they stand is that the sample for a year with its successor is quite distinct from the sample which compares that successor with the year following. Each sample is the same as its successor for a very high percentage of its constituents, but there is enough different matter in each to destroy continuity, especially over a period. The number of concerns in a sample is now more than twice what it was originally. But there is no reason whatever to doubt the representative comparability of each *pair* of years, in their percentage relationship, and taken as a whole, they make a *chain* of perfectly comparable percentage links. From this an index may be constructed which expresses in a common term the whole series, showing not only the relation between any two adjacent years, but also between any separated years in the series.

Apart from the " period of identity " question, to which reference will shortly be made, the chief doubt that arises about this series is its ability to give true aggregates over a wide stretch of time. For each pair of linked years is a static sample, and there is theoretically no room for the effect of an increasing *number* of businesses in the aggregate unless all sample businesses are growing in size to an extent equal to the aggregate. If there are five per cent. of new businesses every year, this would not come out in the series except quite accidentally, and the effect of " unrevealed growth " would not show itself. How serious is this limitation? The Income Tax totals may not be so perfect as annual links, but they are perfect as a time " stretch," and the chain method may be tested by the conformity of its aggregate " stretch " with the assessment totals.

First of all, however, the assessments of averages have to be resolved into their constituent years. This can be done by the use of large samples of assessment—a method I employed in giving the ratio for 1912, 1913 and 1914 in *Taxation during the War* (p. 151); for 1921, 1922, and 1923 in *The National Income*, 1924, and for the years 1903 to 1914 in the paper on *Trade Fluctuations and Profits*. A series for twenty years which satisfies the test of the aggregate at the two ends and the demands of these samples has been constructed.

3. *The Range of Fluctuation—in Theory.*

(1) It is important to note that the *Economist* samples since 1911 show the changes in profits *after* charging debenture interest, but including rents, etc., while the taxed profits show the profits *before* charging debenture interest but *after* deducting rents. On the whole the taxed profits are the more inclusive, and should in theory move upwards and downwards more sluggishly, for the item of debenture interest paid (less rents and rental values) represents a relatively stable constant and the aggregate which includes it should fluctuate with less amplitude. (2) Moreover, the taxation assessment series contains an immense mass of smaller assessments on retail businesses, etc., which do not in fact vary much year by year, and this must reduce the range or violence of variation compared with a series which excludes them almost entirely.

(3) But acting in the opposite direction is the fact that the published results of large public concerns in the *Economist* series have undergone an inevitable smoothing process before they are actually published. There is a fairly general practice of minimizing results in good years and maximizing them in bad years, through stock, debt, and security valuations and other secret reserves (and releases from reserves), which does not survive the taxation scrutiny,

so that the assessments, *ceteris paribus,* should fluctuate *more* widely than the published results.

It is impossible to state, on theoretical or *a priori* grounds, what on balance the net effect of these three factors would be in the comparison of the two series.

The order of magnitude of the first may be judged by the fact that, in the quarter in which the *Economist* gives the most violent decline in net profits, 53·9 per cent., the addition of the debenture interest to the sample would have made the fluctuation 44·1 per cent., but the deduction of the annual property values would have restored a good part of the difference and made the result probably 47 or 48 per cent. The comparison for a quarter in which the decline in the sample was less marked, viz. 10·6 per cent., gives a figure of 9·5 per cent., or 10·0 per cent. if the net position of the tax assessment is in view.

The second factor (small assessments) represents a deduction from the tax assessment totals of something of the order of 12½ per cent. Thus a fall of 10 per cent. on the tax totals would be consistent with 11·43 per cent. on the samples.

The order of magnitude of the third factor or smoothing element in published accounts is quite indeterminate. On balance it may well offset the other two.

4. *The Identity of Period.*

In any known samples of accounts, the business year ends at many different dates, and in the *Economist* series these terminal dates are spread throughout the year.

The sample taken for the last quarter of the year 1931 covers examples with terminal dates stretching from December, 1930, to November, 1931, over a third relating to June, 1931, and just under a third to September, 1931. The weighted average terminal date is 8th August, 1931. The sample for the third quarter stretches from December, 1930, (one-fifth of the whole) to August, March, 1931, accounting for one-third and June for nearly one-third. The average terminal date is 17th April, 1931. The second quarter covers reports running from September, 1930, to May, 1931, 60 per cent. ending in December, 1930, and 27 per cent. in March, 1931, and the average terminal date is 4th February. The first quarter of the year covers cases from June, 1930, to February, 1931, and 68 per cent. end at December 31st, the terminal date being 19th December, 1930.

The weighted average terminal date for the whole year 1931 samples is about 6th or 7th March, 1931, which in itself is not a good "fit" for the calendar year 1930, with which most comparisons have to be made, and which is strictly fitted in other classes of statistics.

Moreover, when we consider the *range* of dispersion, it is even less satisfactory, for only 41 per cent. of the total number of cases end at 31st December, 13 per cent. end in the subsequent June, and 7 per cent. as late as September, while an appreciable number end in the *prior* September or earlier. Now the months prior to 31st December will not, in their final effect, properly balance even an equivalent number of months after December, if the *rate of change of profits is not uniform*. Our next step, therefore, is to regroup the quarters, to get a succession of years ending on 30th September, by putting the fourth quarter of the calendar year forward. This grouping has a mean terminal date, 25th December, 1930, and is, therefore, the nearest approximation to the calendar year that any *complete* grouping of the *Economist* samples can give. But the dispersion is still a wide one, with a heavy sub-modal class ending in June, 1930, balanced by another in June, 1931.

It is possible to get a sample in which the calendar year is really predominant, and the dispersion in balancing sub-modal classes less important. But it means a definite sacrifice in the size of the sample, though none, so far as I can see, in its representative character. If we confine ourselves to the reports published in the first two quarters of the year, the sample is 60 per cent. of the whole, but the proportions of actual calendar year cases rises from 41 per cent. to 63 per cent., and the number falling between 30th November, 1930, and 31st January, 1931, raises it to 72 per cent., while the proportion which falls outside the limit ± 3 months, is less than 5 per cent. The average terminal date is 14th January.

A comparison of the percentage changes exhibited, as in a continuous series, by these two groupings is given on p. 663.

It is unfortunate that no comparison can be made for the stretch of years 1915 to 1922 owing to the extraordinary incidence of the Excess Profits Duty. The figures in brackets in the first column above indicate the index of *gross* profits before the duty was deducted in *respect* of each particular year. But the actual provision for the duty was made by businesses at later dates, differing in the particular cases. Thus, in 1915, when the assessed profit index, *after* deducting the duty attributable to the year, rose only to 119·6, the profit sample index rose to 140·2. As a fact, duty for 1915 was not assessed, or provided for by businesses, until late in 1916 or even in 1917, owing to the nature and date of the legislation, and the assessed profit index, without such provision, registers 144·1 and compares closely with the sample. After that date the business profits were making provision for the earlier years, whereas the assessed profit index in Col. 1 is allowing in each year for the duty assignable to each year. It is important to note that over the period 1915 to 1923, during which this situation worked itself out, the two indexes aggregate to 1,552 and 1,463 respectively, a difference of 6 per cent. only.

The chief value of the series of the assessed profit index carried back to the year 1911 is to test the "stretch" of the chain index against two comparable absolutes over a long period, as some evidence of the validity of the chain index in the long run. It will be seen that by the year 1928 they had come within 4 per cent. of the same point.

TABLE I.

Calendar Year.	Taxed Profits (including Debenture Interest).	Economist Profits (excluding Debenture Interest).		
		First Grouping.	Second Grouping.	Third Grouping.
1911	100	100	100	100
2	110	115·4	114·8	114·8
3	114·6	116·4	119·6	120·8
4	103·6 (106 5)	112·7	114·3	114·6
5	119·6 (144·1)	144·9	141·6	140·2
6	147·2 (199)	159·4	158·3	156·9
7	156·7 (225·5)	162·0	162·3	151·6
8	172·8 (247)	168·0	166·3	156·6
9	230·6 (279·4)	222 7	215	206·1
1920	208·3 (236·2)	178·0	204·2	200·7
1	140·5 (149)	126·4	121·7	122·2
2	185·4 (191)	165·0	156·1	160·3
3	191 (198)	175·9	165·6	169·0
4	195·7 (199)	191·2	182·3	186·2
5	196·3	203·3	194·9	201·1
6	183·2	197·2	190·6	191·7
7	199·6	211·4	203·5	207
8	197·7	211·4	204·3	207·6
9	? 200	210·1	210·8	219
1930		162·8	172·8	185·5
1				151·0

5. *Smoothing by Grouping.*

We are now in a position to examine the alleged smoothing effect of a greater diffusion of terminal dates in the different series, or, to put it in another way, the smoothing effect of the wider standard deviation.

From 1911 down to 1919 the first grouping (the ordinary *Economist* annual grouping, with its mean terminal date of 6th March in the year) has an aggregate of first differences 113·5, the second grouping (a full year's reports to 30th September, with mean terminal date 25th December and a wide dispersion) is 116·7, and the third group (with its terminal at 14th January and closer dispersion) 129·1. These aggregates are adjusted to cover an identical stretch, and they represent the degree of fluctuation between two terminal points, 100 and 206·1. They bear out the point made as to the smoothing effect of dispersion in dates.

Taking the years *from* 1920, the following table of differences is worth studying :—

Year.	First Grouping.		Second Grouping.		Third Grouping.	
1921		−51·6		−82·5		− 78·5
2	38·6		34·4		38·1	
3	10·9		9·5		8·7	
4	15·3		16·7		17·2	
5	12·1		12·6		14·9	
6		− 6·1		− 4·3		− 9·4
7	14·2		12·9		15·3	
8	0		0·8		0·6	
9		− 1·3	6·5		11·4	
	91·1	−59·0	93·4	−86·8	106·2	87·9
	32·1 net		6·6 net		18·3 net	
	150·1 aggregate −32·1 rise*		180·2 aggregate − 6·6 rise		194·1 aggregate − 18·3 rise	
	118·0 net		173·6 net		175·8 net	

* The net rise is deducted, so that the differences cover an identical stretch.

It is true that, with the fewness of years of reverse fluctuations, these tests are not very important, but such as they are, they are in direct support of the view that the third grouping I have chosen gives a sharper and clearer result for the calendar year.

At times when there is a " turn in the tide," the quarterly figures are well worth examination, for, if there is a peak or trough culminating in mid-year, results taken on either side of the point of change will exhibit sharper results than those of the calendar year, which cuts off the apex or throws a plank across the ditch, so to speak.

Let us take May, 1920, the turn of the price level, or " break," and beginning of the depression. The 1921 first quarter's reports, ending, say, in the autumn of 1920 with a preponderance of " pre-break " profits, showed an increase of 3·5 per cent. compared with 27·1 increase in the previous quarter's reports. The second quarter, with a slight majority of months post-break, began the declines with 8·4 per cent. The third quarter, with nearly all its months of account in the post-break period, was minus 42·4 per cent., while the fourth quarter, with its mean terminal date in August, was wholly " post-break " and gave 52·9 per cent. decline. These results are cloaked by the calendar year figures, but the third grouping gives a much closer rendering from 1919 to 1920, because the first group stretches actually so far into 1921 in giving its 1920 results.

Now look at April, 1925, when the gold standard was restored and special deflation resulted. The first grouping, by stretching the calendar year's samples further forward to the point of change, takes the index higher, and the year's accounts in two second quarters that are half clear of the break showed an increase of 3·2 against the preceding increase of 8·0 per cent., and the two next quarters gave falls of 4·8 per cent. In 1931 we went off the gold standard in September. The fourth quarter's reports with their terminal date in August, prior to that date, had the maximum fall of 53·9 per cent., while the next quarter with its mean terminal date after September was 14·3 only.

6. *Is the Sample Representative?*

(1) It would appear probable that in its separate sections the sample must be quite unrepresentative, for the numbers in the groups are small, and they tend to take only the largest cases. Nevertheless, the *amount* of profits in the sections is sometimes so considerable a part of the whole that the effect of bringing in a mass of small cases could not be very important unless their trend runs quite counter to the large ones. Where an industry is to a considerable extent in private hands, or in small units, the published results of large companies may be wide of the general average. Thus coal-mining is about 60 per cent. under companies in numbers, but about 95 per cent. in profits. Cotton and wool are predominantly company-held, and so are iron and steel. But building, timber and printing are predominantly under private management. If the large concerns here sampled tend to be those with greatest fluctuations, or if the most fluctuating industries tend to be over-represented in the sample, then the sample as a whole will be unrepresentative. I have some knowledge of the relative proportions of the profits of different industries in their aggregated tax assessment, and the proportion in the *Economist* sample can be obtained from the summaries. From this I should say that the groups substantially over-represented in the sample are Breweries, Oil, Tea and Textiles, while Hotels and Iron, Coal, and Steel, are under-sampled, most of the other groups being roughly of a reasonable order. I find it difficult to conclude that the more fluctuating industries are unduly sampled, but undoubtedly the large concerns are predominant. But there is no evidence that it is an unfair sample of *large* concerns as such, and the value of the large concerns

in the mass of profit is so great that the non-sampling of the small ones at all is of less moment than might appear. It would be quite another matter, however, if instead of the average *aggregate* percentage change we were seeking the modal change of all businesses.

(2) The second possible reason for defect in the sample for *comparison with home conditions* in production, etc., is the inclusion of purely foreign profits (*e.g.* Oil, Tea, Rubber), if those profits fluctuate more widely than home profits. Examination of the record for Rubber and Tea shows clearly that their fluctuations are enormously greater than the general run, while the Oil sample shows an aggregate of percentage differences (since 1914) about half as much again as the big miscellaneous group. However, the assumption that the inclusion of tea, oil, and rubber profits on such a scale in the sample *must* make its fluctuations greater than they would otherwise be breaks down completely on examination for the eleven years 1920–1930. Taking the annual summaries to June, and deducting these three classes from the totals, I constructed an index number for the net totals. Pivoting both samples at 100 in 1924, the full sample begins at 122·2 in 1920 against 123·6 for the net sample, and ends at 100·8 against 103·5. The average deviation in both series is 12, and the coefficient of dispersion 11·9 for both. At the same time, the examination revealed an important influence in 1926 when the net sample rose much less than the full sample and 1928 when it rises much more (and compensates). This has some bearing on the divergence between the assessment series and the sample series in 1926. (It is not possible to make an elimination of all actual foreign profits.)

(3) *Is the sample large enough?* In the number of businesses it is very small, say, 0·5 per cent. (excluding retail businesses), but in the aggregate of profits, 200 millions, it is about 20 per cent.

(4) *The Times Trade Engineering Supplement* (May 4th, 1932) gave a sample of 108 concerns in twelve groups running consistently from 1922–31, and, for the purposes of comparison with the other indices (production, prices, etc.) employed an index "based on unweighted arithmetical averages of the earnings ratios for each year of the twelve groups." The figures are not given, but they appear to be approximately as follows: 1922, 85; 1923, 90·5; 1924, 100; 1925, 97; 1926, 88; 1927, 93; 1928, 90; 1929, 93; 1930, 81; 1931, 50. The absence of weighting gives special prominence to motor accessories and cycles, and the series is not in any way comparable with those given above.

(5) Since the main part of this paper was written, the *Economist* has been doing some new work upon its own samples (April 30th,

May 7th, 1932). It gives the "defects" of its series of tables for a continuous series as follows:

(1) The lumping together of home and foreign concerns.
(2) The deduction of debenture interest.
(3) Variation in the deductions for income tax in "declaring" profits.
(4) The various terminal dates of accounts.
(5) The lag in the accounts for holding companies.
(6) The influence, in times of violent fluctuations, of the different quarters in which important companies may publish their accounts.
(7) The disproportionate size of the miscellaneous group.

Commenting upon these: (1) is not a drawback for all purposes—only when a direct comparison with home production is desired; (2) is a distinct advantage when measuring the impetus for the entrepreneur; (4) has been reduced to a minimum in my method; (5) and (6) are reduced to a minimum, since 31st December is dominant in the samples of 1st and 2nd quarters; (7) is not a disadvantage in an aggregate index.

The *Economist* then makes a picked sample of 700 companies, as from 1924, eliminating trusts and financial companies, holding companies, certain rubber companies, and *adds back* debenture interest. The results for manufacturing and mining are:

	1924.	1927.	1928.	1929.	1930.	1931.
Net profits	100	109	101	109	91	73
Volume of production...	100	106·8	105·5	111·8	103·3	93·7
Profits per unit ...	100	97·5	96	97·5	88	78

The figures for the group "Transport, Distribution, and Services" are:

1924.	1925.	1926.	1927.	1928.	1929.	1930.	1931.
100	105	100	110	115	120	109	86

and companies operating overseas:

100	110	107	103	101	95	67

The *Economist* does not attempt to combine them in a general total because of the difficulty of weighting. A straight average of the three would give:

1924.	1925.	1926.	1927.	1928.	1929.	1930.
100	102·3	96·3	105·6	105·6	108	89

This series, so far as it goes, shows some resemblance to the aggregate tax results.

7. *The Essentials of an Index.*

We have at this stage to ask ourselves what we really seek most in a profits index, and it may be well to summarize the elements in the assessed profit series which would tend to make it the more inert of the two:

(1) The inclusion of debenture and other interest.
(2) The large mass of conventional assessments which change little from year to year—from 12½ to 20 per cent. of the whole.
(3) Included in (2) partly, the fact that retail business generally has avoided the main vicissitudes of profits felt by industry.
(4) The regular and conventional treatment of depreciation.
(5) The entire omission of many losses.
(6) The smoothing effect of a spread of terminal dates over the whole year.
(7) The lesser proportion of the highly fluctuating trades.

To set against this we have the elimination of some of the equalizing devices adopted in commercial accountancy, which may be of great importance. The *Economist* sample, moreover, suffers from a certain double counting, from which the assessments are free, and which may reduce its fluctuations somewhat. The full profits of both A and B are included, although B may derive dividends from A. Suppose that A rises from £100,000 to £130,000, and B from £100,000 to £120,000, the sample registers a rise of £50,000, or 25 per cent. But if B drew a dividend from A of £35,000 (which was increased only to £40,000) the combined net incomes for assessment purposes would rise from £165,000 to £210,000, or over 27 per cent. (If the dividend was unchanged the rise would be over 30 per cent.) Inasmuch as the debenture interest, preference, and even ordinary dividends tend to move more sluggishly than profits, their inclusion, as profits, by duplication must have a perceptibly slowing down effect upon the sample.

8. *The Effect of Losses in the Aggregate Figures.*

The *Economist* sample contains a good number of cases in which losses appear, and these affect the aggregate ratios to the full extent. But the assessments, even under the average system, did not reflect losses to the full extent in the aggregate, as a minus average is not recorded. Under the present single-year basis this tends to make the aggregates move more slowly, for in the years when losses are heavy, the aggregate is too high and does not register the full extent of depression, while, inasmuch as losses can be carried forward for deduction from later profits, when better times come the aggregates must be weighted downwards and do not show the full current profits. It is obvious that in bad times much more is below the line, and much less above, so that the unrecorded losses bear a much bigger proportion to the recorded profits than in good times, and it is not simply a question of regarding undeducted losses as a constant proportion, not affecting the rate of variation.

The order of magnitude of the difference that this may make can be seen from an examination of the profits of Corporations in the United States (*Vide* Appendix B). They are reduced to indexes in the following table.

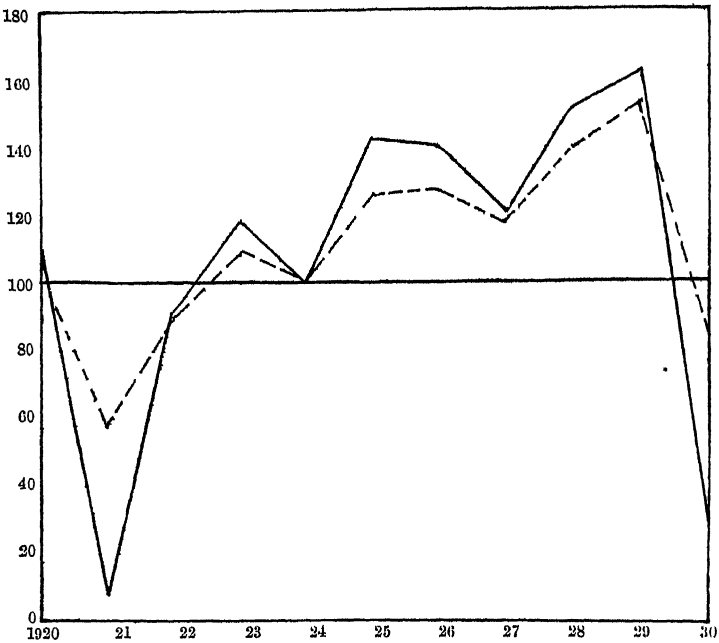
TABLE II.

Index (1924 = 100) *for profits of United States Corporations.*

Year.	Cases making Profits.	Cases making Losses.	All Cases—Net Profits.
1920	104·3	91·2	109·5
1	57·2	174·4	8·5
2	91·8	98·7	89
3	109·8	90·6	117·6
4	100	100	100
5	126·5	88·3	143
6	127·6	97·6	139·9
7	118·3	111·2	121·4
8	140·0	107·6	153·4
9	153·8	131·0	162·6
1930	84·4 est.	213·0 est.	30·6 est.
Average deviation ...	20·8		36·2
Coefficient	18·9		33·8

It will be seen that the coefficient of dispersion of the cases making profits is 9·8, but of all cases after deducting losses it is 33·8, and the effect is clearly seen in the following graph 1. In this the profit-making cases aggregate is always fluctuating well within the net aggregate of all cases. The lesson, for our own comparison, is that the assessment index, which tends to be like the former, must be less lively than the *Economist* sample, which tends to be like the latter. One must not assume that the proportion of losses to the profits, which in the eleven years aggregate is 31 per cent. for the United States, is necessarily the same in this country. (In Dr. Coates' sample given to the Colwyn Committee, 14·3 per cent. of the total *turnover* was in the loss-making classes in 1922, so that it was about 17 per cent. of the turnover resulting in profit, and in 1922 the percentage of loss cases to profit cases in the United States was 31 per cent. The comparison is, of course, not exact since the amount of profit and loss respectively per unit of turnover is almost certainly not identical.)

GRAPH I.



- - - - Aggregate of cases making profits (Index 1924 = 100).
——— ,, ,, all cases after deducting losses.

9. *The Index Computed.*

Now we certainly desire to know the mobility of profits against prices, employment, production, etc., in the *area* in which such mobility exists. We desire to know, too, the change in the profit incentive (which comes on the ordinary share capital), and these factors would not be wholly supplied by the assessed profits index. On the other hand, the *Economist* sample seems prima facie too lively, with its bias of large cases and fluctuating industries. My personal feeling is that a combination of the two types will yield us a series giving most satisfaction, for most purposes, most of the time. I have accordingly combined them, pivoted about 1924 (for comparative purposes), and not going back prior to 1920, in Col. 1 of Table III below. The details are given in Appendix C. This I regard as the general profit index, comparable, for example, with the production index, and to be used when the whole return, apart from wages and rents, upon business of all kinds is under consideration.

But for some purposes we need a different type of "change indicator," especially when we have in view the actual *incentive* to new business and risk-taking. For this purpose, a series representing the changes in the profit flow, *after* paying not only debenture interest, but also dividends on preference capital, and unladen by a mass of steady *personal* earnings (as in shopkeeping), is desirable. This special sub-index I have constructed as follows: the percentage of total net profit (for my third grouping) actually paid in preference dividend gives a deduction from each year's index figure, and a net series, which is again converted into an index pivoted on 1924 at 100, in Col. 2 of the Table below. (See Appendix D for details.)

If the two indexes I now offer prove to have any utility to investigators and economists, I propose every July, to add the latest year and to revise the provisional items in the series in the light of the latest material, and to make the results public.

TABLE III.

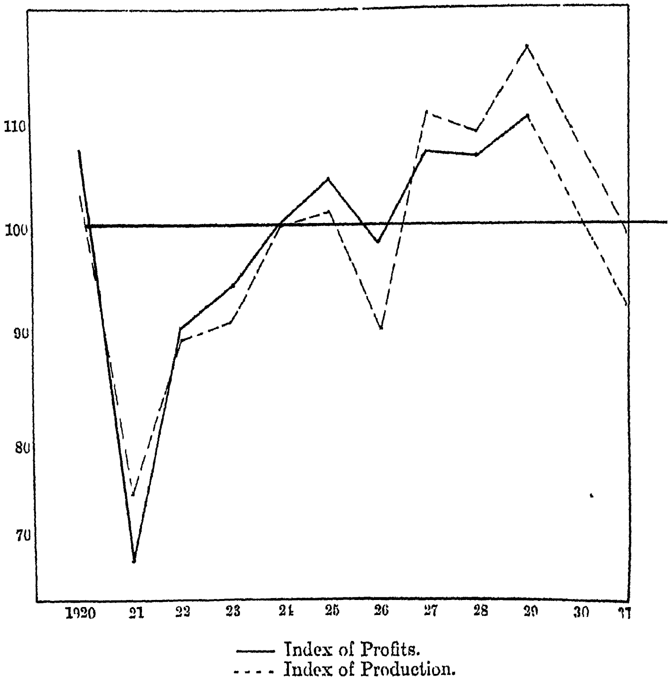
Year.	General Profit Index.*	Sub-index for Ordinary Capital.	Index of Production.†	Prices.			Col. 1 divided by Col. 6.	Foreign Trade.				Bankers Clearing (Country).
				Board of Trade.	Statist.	Cost of Living Index.		Retained Imports Values.	Exports of British Produce.	*Volume* of Gross Imports.	*Volume* of Exports.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1920	107·0	112	104·7	184·9	180·5	142·2	75					141
1	68·7	57·3	75·3	115·6	111·5	129	53					103·5
2	90·4	84·5	89·3	95·5	94·2	104·5	86					96·8
3	94·1	90·6	91·1	95·6	92·8	99·4	94					97
4	100	100·0	100	100	100	100	100	100	100	100	100	100
5	104·1	109·3	104·1	95·8	98	100·6	103	98·8	97·3	103·1	99·1	102
6	98·3	103	90·2	89·1	90·7	98·3	100	90·4	91·7	106·3	88·3	97·2
7	106·5	111·4	110·2	85·2	88	96	111	86·6	86·5	109·3	100·3	102·5
8	106·2	110·7	108·5	84·4	86·3	94·8	112	87·7	86·3	105·7	102·2	104·8
9	109·9‡	114·3	116·2	82·1	82·7	93·7	117‡	85·7	81·1	110·9	101·8	106·2
1930	100·9§	91·4	107·5	71·9	69·8	90·3	112§	75·6	80·3	108·1	87·6	102·2
1	90§	73·3‡	99·1	62·6	59	81	109§	61·2	71·8	110·6	69·0	94·9

* Third grouping and assessment series combined.
† London and Cambridge Series.
‡ Provisional estimates, subject to early verification.
§ Very provisional estimate.

10. *Profits and Production.*

The graph on p. 672 shows the movements of Col. 1 and Col. 3 of the Table, and the degree of correspondence between the volume of production and the amount of money profits. Turning the volume into total values, by the price index, does not improve the correspondence with profits, and the effect of lower prices in reducing production has been very marked. For a comparison with the previous conditions I would refer to my paper on the *Effect of Trade Fluctuations upon Profits* (*Statistical Journal*, 1918, p. 591). I had reason to conclude then that the Bankers Clearing House figures moved most closely with profits, and I have given the Country clearings in Col. 12 of the Table above.

GRAPH 2.



11. *Profits in Great Britain and the United States.*

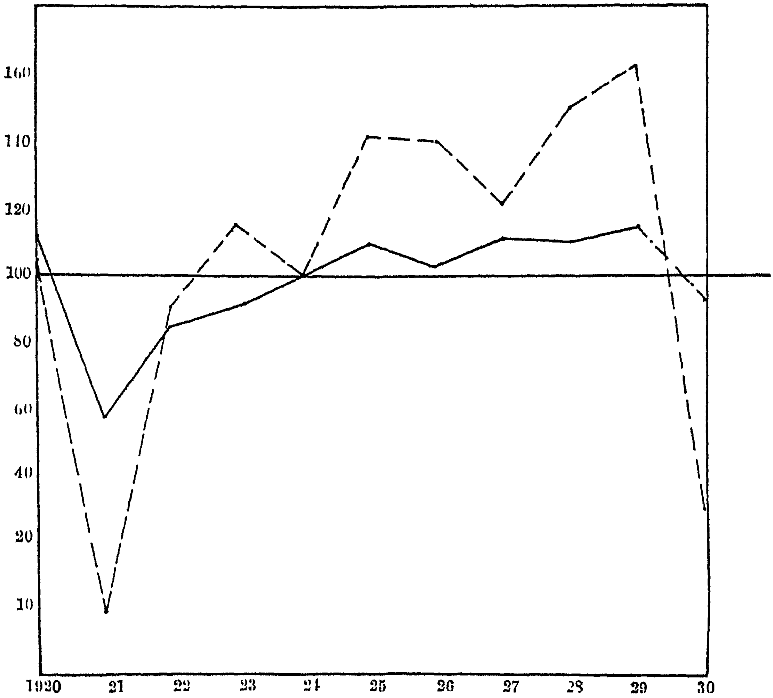
In Graph 3 below, I compare the two countries, using the sub-index as the "liveliest" for this country, and an index derived from the taxation returns (vide Appendix B) for the United States. The capacity of the States for enjoying depression and prosperity to the fullest extent possible is well illustrated.

12. *Conclusion.*

It must always be remembered that these indices of profits are for *aggregate profit*, and not *rate of profit on Capital*. As the total invested capital increases year by year, the *rate* of return on capital is exaggerated by these indices, and there is no way of relating the indices to units of *invested* capital, for which there are no statistical aggregates whatever, nor are any obtainable in the nature of the case.

I regard all such indices as these, when they get far away from their base, as subject to an increasing margin of error, unless a new base is made by an absolute test and worked backwards to link

GRAPH 3.



—— British Profits.
- - - - U.S.A. Profits.

with the original series. The difficulties over the cost of living index are well known in this respect, and only a completely new basis, objectively determined, with retrospective calculations to "splice" the original series, can meet them. The index of production finds its judgment day in each new Census of Production. Price indices can be re-made and re-weighted. The index of profits must be periodically tied down to the tax assessment aggregates (for a suitable average of years) as an absolute check, and its variations worked retrospectively by samples.

It will be seen that the main data upon which we must rely do not in themselves form index numbers, and remain only the raw material for them, needing close scrutiny and constant check from various angles. It does not follow, however, that an index number that is not entirely automatic in its construction and perpetuation, is for that reason useless or unworthy of credence. It is the best that is obtainable in the circumstances, and it is doubtful whether, for such a subject as profits— itself capable of many different conceptions and uses—any objectively independent and self-regulating mechanism for an index number will ever be possible.

I have deliberately chosen the year 1924 as the base, because (1) it has been adopted for so many other sets of statistics, such as the Board of Trade Index of Production, (2) it gets free from the statistical difficulties associated with the separation of the Irish Free State, (3) it was, in itself, perhaps the best *nodal* year since the war. It will be seen that I have taken out no time trends, linear or otherwise, for in such a stationary period they would be entirely artificial; nor does any cyclical influence survive the succession of extraordinary economic phenomena; while correlation coefficients for such a short series are hardly appropriate, even if one were courageous enough to be seen in their company, until they have once again won their way into the society of economic proof.

APPENDIX A.

Summary of Quarterly Reports published in The Economist

Years contrasted.	Quarter.	No. of Cos.	Profits, £'000. First year.	Profits, £'000 Second year.	Percentage change on the Year.
1909/10	1	267	14,892	15,751	5·7
	2	221	11,618	12,984	11·7
	3	133	7,105	8,649	21·7
	4	154	8,930	10,139	13·5
	Total	775	42,545	47,523	11·7
1910/11	1	270	16,265	17,887	10
	2	223	13,858	15,564	12·3
	3	119	8,329	8,921	7·1
	4	162	10,218	10·505	2·8
	Total	774	48,670	52,878	8·6
1911/12	1	279	17,825	18,767	5·3
	2	262	18,674	18,956	1·5
	3	129	8,599	8,458	— 1·6
	4	197	13,118	14,026	7
	Total	867	58,216	60,207	3·4
1912/13	1	300	18,876	21,042	11·5
	2	292	20,585	24,259	17·8
	3	128	8,475	10,748	25·8
	4	213	13,134	14,462	10·1
	Total	933	61,071	70,510	15·4
1913/14	1	301	20,451	22,136	8·4
	2	263	22,649	23,596	4·2
	3	131	10,616	9,490	— 9·5
	4	214	15,320	14,462	— 5·6
	Total	909	69,037	69,685	0·9

Years contrasted.	Quarter.	No. of Cos	Profits, £'000 First year.	Profits, £'000 Second year.	Percentage change on the Year
1914/15	1	293	20,790	19,799	— 4·8
	2	285	23,667	22,375	— 5·4
	3	142	10,649	10,707	0·5
	4	208	14,209	14,046	1·3
	Total	928	69,315	66,927	— 3·2
1915/16	1	286	20,048	23,537	17·4
	2	311	23,792	33,924	42·6
	3	139	10,439	13,359	27·9
	4	196	12,951	15,768	21·8
	Total	932	67,230	86,588	28·6
1916/17	1	253	21,074	23,617	12·0
	2	330	26,310	29,323	11·4
	3	337	17,477	18,261	4·5
	4	380	17,677	19,561	10·7
	Total	1,300	82,537	90,761	10·0
1917/18	1	347	27,589	27,319	— 1·0
	2	409	28,071	26,431	— 5·8
	3	321	19,392	21,770	12·3
	4	305	21,072	22,092	4·7
	Total	1,382	96,124	97,612	1·6
1918/19	1	436	31,588	35,289	10·4
	2	430	31,472	29,874	— 5·1
	3	259	17,439	16·843	— 3·4
	4	292	20 503	22,661	10·5
	Total	1,417	101,003	104,668	3·7
1919/20	1	440	34,591	43,926	26·9
	2	355	25,975	35,779	37·8
	3	252	19,045	27,032	41·9
	4	334	21,727	27,664	27·1
	Total	1,381	101,337	134,401	32·6
1920/21	1	412	41,916	43,388	3·5
	2	355	44,173	40,467	— 8·4
	3	232	24,158	13,913	— 42·4
	4	311	30,272	14,268	— 52·9
	Total	1,310	140,519	112,036	— 20·1
1921/22	1	442	47,369	26,786	— 43·4
	2	401	38,045	25,196	— 33·7
	3	209	15,854	12,120	— 23·5
	4	319	23,310	24,229	3·9
	Total	1,371	124,578	88,331	— 29·0
1922/23	1	405	28,490	40,277	41·4
	2	425	31,875	38,946	22·1
	3	209	10,469	17,317	65·2
	4	312	23,383	26,044	11·4
	Total	1,351	94,217	122,584	30·6

Years contrasted.	Quarter.	No. of Cos.	Profits, £'000, First year.	Profits, £'000, Second year.	Percentage change on the Year.
1923/24	1	419	37,155	40,383	8·7
	2	466	49,791	51,293	3·0
	3	214	17,667	18,070	2·3
	4	312	26,143	29,617	13·3
	Total	1,411	130,759	139,362	6·6
1924/25	1	425	41,543	45,306	9·1
	2	492	51,284	56,986	11·1
	3	233	17,773	18,627	4·8
	4	340	32,012	34,071	6·1
	Total	1,490	142,611	151,993	8·7
1925/26	1	460	48,027	51,691	7·6
	2	442	55,835	60,489	8·3
	3	256	23,409	24,060	2·8
	4	414	37,273	38,693	3·8
	Total	1,572	164,543	174,933	6·3
1926/27	1	520	54,477	52,288	−1·0
	2	509	67,739	64,102	−5·7
	3	237	19,077	19,528	2·4
	4	403	33,432	33,525	0·3
	Total	1,669	174,724	169,444	−3·0
1927/28	1	504	53,645	61,823	15·2
	2	556	57,730	58,478	1·3
	3	237	21,171	23,222	9·7
	4	412	35,036	36,121	3·1
	Total	1,709	167,582	179,643	7·2
1928/29	1	454	58,966	59,870	1·5
	2	639	78,663	78,079	−0·7
	3	257	24,039	23,328	−3·0
	4	420	32,949	33,405	1·4
	Total	1,770	194,617	194,681	0·0
1929/30	1	516	60,888	62,021	1·9
	2	578	73,424	79,717	8·6
	3	329	25,232	23,627	6·1
	4	509	39,272	32,175	−18·1
	Total	1,932	198,818	197,540	0·6
1930/31	1	596	75,816	67,736	−10·6
	2	619	79,491	64,051	−19·4
	3	320	24,794	15,997	−35·5
	4	474	26,460	12,293	−53·9
	Total	2,009	206,561	160,077	−22·5
1931/32 (part) ...	1	548	63,404	54,315	−14·3
	2 (part)	675	72,998	56,834	−22·1
	Total	1223	136,402	111,119	18·6

APPENDIX B.

United States—Net Profits of Corporations.

(In millions, $.)

Year.	Net Profits of Corporations making Profits	Losses of Corporations making Losses.	Net Profits of all Corporations.
1920	7,903	2,029	5,874
1	4,336	3,878	458
2	6,964	2,194	4,770
3	8,322	2,014	6,308
4	7,587	2,224	5,363
5	9,584	1,963	7,621
6	9,673	2,169	7,504
7	8,982	2,472	6,510
8	10,618	2,391	8,227
9	11,654	2,914	8,740
1930	5,627 part year	4,205 part year	1,422 part 1,644 est. whole

APPENDIX C.

Year.	Third Grouping.		Assessment Series.		Combined Index.
	First Index.	New Index.	As Given.	New Index.	
1920	200·7	107·7	208·3	106·4	107
1	122·2	65·6	140·5	71·8	68·7
2	160·3	86·1	185·4	94·7	90·1
3	169	90·7	191	97·6	94·1
4	186·2	100	195·7	100	100
5	201·1	108	196·3	100·3	104·1
6	191·7	103	183·2	93·6	98·3
7	207	111	199·6	102	106·5
8	207·6	111·5	197·7	101	106·2
9	219	117·6	200	102·2	109·9
1930	185·5	99·6			
1	152·7 (part)	82			

APPENDIX D.

Year.	Third Grouping Index.	Percentage paid on Preference Dividend.	Deduction from Col. 1 for Col. 2.	Third Grouping, Net Series.	New Index.
	(1)	(2)	(3)	(4)	(5)
1920	107·7	17·2	18·5	89·2	112
1	65·6	30·5	20·0	45·6	57·3
2	86·1	21·8	18·8	67·3	84·5
3	90·7	20·5	18·6	72·1	90·6
4	100	20·4	20·4	79·6	100
5	108	19·4	21·0	87·0	109·3
6	103	20·4	21·0	82·0	103
7	111	20·1	22·3	88·7	111·4
8	111·5	21·0	23·4	88·1	110·7
9	117·6	22·6	26·6	91·0	114·3
1930	99·6	24·5	24·4	75·2	94·4
1	82	21·5	17·6	64·4	80·9

APPENDIX E.

From Inland Revenue Reports.

(In millions, £.)

Years.	Manufacturing, Production and Mining.	Distribution, Transport, and Communications.		Finance, Professions, and Other Profits.	Deductions. Wear and Tear.	Other Reductions and Discharges.
		Railways.	Other.			
1920/21 ...	525·0	60·0	439·0	157·6	51·7	534·4
1921/22 ...	558·0	61·2	486·0	180·5	52·8	424·2
1922/23 ...	512·2	51·4	500·9	197·6	57·6	388·3
1923/24 ...	483·4	48·2	450·5	177·1	54·6	257·7
1924/25 ...	460·5	83·6	438·0	176·5	55·9	221·4
1925/26 ...	500·0	50·0	457·3	183·8	69·1	227·2
1926/27 ...	503·0	39·6	468·4	187·1	73·2	209·7
1927/28 ...	472·8	29·9	456·9	194·2	72·5	216·2
1928/29 ...	478·0	37·2	486·5	198·1	80·0	221·0
1929/30 ...	478·2	37·3	494·2	212·4	87·6	224·3

PROCEEDINGS OF THE MEETING

MR. FLUX: In accordance with the custom of at any rate recent times, it is the privilege of the immediate predecessor in office of the President delivering an address before the Society to move a Vote of Thanks for the address. I should have regretted very much if I had, for any reason whatever, not been able to claim this privilege, for I feel it personally to be an honour to hold this relation to Sir Josiah Stamp in work done in association with our Society.

In the gradual building up of a mass of material which helps us to judge of where we are going, how fast we are moving, and, generally, in placing us in a position to venture on judgment as to what is the best thing to do for the immediate future, Sir Josiah has taken a very large share, and the address given us to-night is one further link in a chain which has been gradually built up over a long series of years.

We are accustomed to hear that the characteristic Civil servant is a person who is very cautious and very hesitant to venture on doubtful ground. I think it would be impossible for anyone to imagine that those characteristics could have been the most outstanding characteristics of our President either when he was a Civil servant or since. To-night he has boldly ventured on new ground and, in making these bold ventures into territory unexplored and very difficult to survey, the very boldness of his attack has enabled him to achieve results which, as the characteristic Civil servant, the ordinary critics would have declared it was impossible that he could reach. The field is a very difficult field, and the material, as is pointed out in our President's address, is very difficult material to handle. The success with which the difficulties have been outflanked is a matter on which you will all wish to congratulate the President.

With several of the opinions expressed in the address, particularly towards its close, I have the most unbounded sympathy; in the expression of the opinion that many of the indices regarding economic matters with which we are concerned cannot in their very nature be continuous over several decades, or even over centuries, he has voiced a doctrine in which I have a profound belief, and I welcome very much this expression of the belief of one whose opinion will go much further than my own. The fact that we are dealing with a living and changing organism has long convinced me that we cannot use an unchanged measuring rod to measure its fluctuations, but that we must constantly readjust our measuring rod and content ourselves with reviewing matters over a series of relatively short periods. We may thus gradually build up a history of a long-period movement which will, however, not provide one uniform continuous index framed from an unchanging formula over a half-century or century or longer period still. I welcome very much the support which that view has gained from the President's emphatic opinion expressed towards the end of his address. He has reminded us, too, that those who have been concerned in the formation of such indices as the Board of Trade Index of Productive Activity are shortly to be called up for judgment, when the police have had time to complete their case, and I should hope, with regard both to the indices to which we have been introduced to-night, and that other index which I have just mentioned, that the prisoners, when they appear at the bar, need have no fear of the judgment of the Court.

There are one or two points to which reference has been made and on which I should like—without over-stepping the bounds of what is customary on these occasions—to make one or two passing remarks. Perhaps the first point I am going to mention is of less importance than it might appear to be; it is that while the *Economist* collects a very large amount of material, there is not only the private trader that is outside the *Economist's* scope, but a large number of private Companies not issuing accounts available for the purpose of inclusion in the *Economist* table. Some of these are organizations of no small importance. Further than that, the merger of private into public Companies in the course of twenty years adds to the difficulty. Companies at one time outside the field have been brought inside the field, and vice versa. You will agree that the results set out in the address entirely warrant the venturing into a field where there were so many red flags of warning that the going was dangerous.

Another matter that interested me—a point of very serious difficulty, and I am sure you will appreciate the ingenuity with which our President has dealt with the difficulty—was the series of figures showing the different periods of time from the conclusion of the period in which profits were made to the date when they were brought into the published accounts. I think it probable that in the near future there will become available a piece of information which will have added interest in this connection, viz. the distribution of the years of account of manufacturing firms in the country. If the need for economy had not compelled a limitation of work on the material relating to the 1924 Census of Production, we might have had some data from that survey. I have seen summaries relating to the reports for the 1930 Census so far published, which show the distribution of the years of account covered by those returns. In these summaries I was struck by the way in which the emphasis in the series of figures gathered varies from the emphasis as it would lie if the period between the conclusion of the year of account and the entry into the records was always the same. The last quarter of the year, so far as the trades that have been covered for the 1930 Census up to the present are concerned, covers something like 65 per cent. of the firms reported on, and a little less than that percentage of the persons employed. The first quarter of the year is the next most important, not in that case the following June quarter, indicating what a confusing element has here to be dealt with. It leads me personally to look with even greater admiration on the skill with which our President has dealt with these essential and necessary complications of the material that he has had to handle. It is but one more illustration of the mastery in the field of statistics to which we have been accustomed from him, which was one of the reasons why the whole of the Society welcomed two years ago his acceptance of the offer of the Presidency then made to him. The two years of his Presidency have been years of notable work. I think if we examine the list of topics dealt with we shall find that they have added quite a good deal to the statistical material available for dealing with the problems of the time. It has struck me recently how much our Society has been free from the challenge that it deals with abstruse problems with which the business world of to-day is not much concerned. It has maintained its reputation in that regard, and if there were no more to bring to account in these years than the two addresses of our President, the reputation of our Society has been enhanced as being well abreast with the time.

I therefore move that our best thanks be tendered to our President both for the address he has delivered to us this evening and, apart altogether from the general vote of thanks passed earlier in the proceedings to the outgoing Executive officers and Council, for the work he has done for our Society in the last two years in particular and during the whole of his connection with our body.

Sir Bernard Mallet: I had the honour of seconding the motion proposed by Mr. Flux to the President on the occasion of his first presidential address; it is pleasant that the same duty should fall on the same team on the occasion of his second and last presidential address.

Besides the qualification, or rather, perhaps, disqualification, of being senior ex-President, I had that of some acquaintance with the subject discussed on that occasion; to-night I am afraid I have no technical knowledge of this subject. You have heard expert criticism from Mr. Flux, and I dare say you will hear more from Mr. Yule, and therefore on this occasion I shall take refuge behind the rule of the Society which discourages criticism and discussion of Presidential Addresses!

What I can do is to express the great gratitude of the Society to Sir Josiah Stamp for all he has done for the Society. I understand that during the two years he has hardly missed a single meeting of the Executive or Council, which seems to me nothing short of a marvel for the busiest man in England. His diligence in our interests and the prestige of his name will, I am sure, have the effect of enabling the Royal Statistical Society to go forward to its Centenary celebrations with much enhanced reputation and authority.

I have very great pleasure in seconding the Vote of Thanks.

Mr. Udny Yule: It would obviously be most improper to throw on the President the duty of putting to the meeting the Vote of Thanks moved by Mr. Flux and seconded by Sir Bernard Mallet; I therefore consented to undertake that honour. I need not add much to what has been said; I do not wish to add to the discussion of technical points, and am in most full agreement with Mr. Flux in what he has said on the ability with which the technical difficulties have been mastered, and the skill with which those difficulties have been explained so that anyone can follow step by step the problems to be surmounted.

Mr. Flux reminded us that at one time the President was a member of the Civil Service, and it passed through my mind how much the Civil servant must have improved since the days of the Queen of Sheba. The Queen of Sheba, when she received a letter from Solomon the King, summoned all her wise men—the dim forefathers of our Civil servants—and requested them to read the letter; but they all fell on their faces and exclaimed with one voice, "O Queen, our intelligence is limited and our incompetence is a great incompetence; we cannot read the letter from Solomon the King." I cannot picture our President, even in his Civil Service days, taking that attitude towards a problem presented to him.

There is only one unpleasant feeling associated in our minds this evening with the reading of this address,—the memory that it is our President's valedictory address. It is true that it is his valedictory address, but let us hope that it is by no means his last contribution to our proceedings.

I beg to put to the meeting the Vote of Thanks to the President not only for this address, but for all the work he has done for the Society in his long association with it, and in particular during the last two years.

The Motion was put to the meeting and carried unanimously.

SIR JOSIAH STAMP, in reply, said: I thank you very much for that cordial Vote of Thanks and I thank the movers for their speeches. I do not intend to add to my general address a sub-address on the paper; I will only make one or two remarks upon two features mentioned by Mr. Flux.

I started on my work on the *Economist* sample with considerable distrust as to its having any particular value for this purpose, but the more I examined it, the more I found the special points I had in mind were really insignificant. I think it is true to say that as a financial newspaper, taking what records come to it, the best use is made of all the results of public Companies received. One would not accuse them of going to the highways and hedges to drag things in, and it is possible there may be Companies of particular importance which do not want to draw attention to the character of their results, either because they are too good or too bad. I think it will be found that there is a slight difference between the weekly summaries and actual reports of the summaries in the total numbers.

On the general subject, I hope you will endorse what I have done as at any rate being worth attempting. Only time will prove whether it will bear any weight. One must be patient, and I shall not be in the least disappointed if it is pointed out to me that it is invalid. The great thing is to make a start, and that is what I attempted. I shall be greatly obliged to any who will give me any reflections as to anything obscure or that is not included and very glad of help in any work upon the table and for any suggestions.

I thank you very sincerely for your Vote of Thanks and for the kind things that have been said.

MISCELLANEA.

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Infantile Mortality in Australia, 1906–1930.

By H. J. Exley, M.A., Supervisor of Census, Canberra, Australia.

1. *Introductory.*

One of the most instructive and at the same time most encouraging studies in the realm of Vital Statistics is an inquiry into the infantile mortality of a country.

A casual study discloses striking divergences between the mortality experienced in various European States, and divergences which are even more remarkable appear when the comparison is extended to include other continents. Recent mortality rates range from 34 per thousand births in New Zealand to 197 in Rumania.

With the exception of New Zealand, Australia has the lowest infantile mortality rate in the world, though three European countries, Norway, the Netherlands, and Switzerland, are not far behind.

The magnitude of the annual loss of infants is shown by the fact that since 1871, 562,675 infants born in Australia have failed to reach their first birthday. The net immigration during the same period was 1,135,734, so that almost exactly half these immigrants were needed to make good the loss of Australia's best immigrants, the babies who died during their first year.

Certain data in respect of infantile mortality have been compiled in Australia for many years, and continuous records are available from 1870. The comparisons in the following pages are, however, mainly restricted to the period 1906–30, as it is only since the establishment of the Commonwealth Bureau of Census and Statistics in 1906 that uniform information in respect of ages and causes of death has been available.

The first table shows the quinquennial rates for Australia since 1871. While the rates showed an improvement after 1885, it was neither continuous nor of great extent, nor was it common to the separate states. The real improvement dates roughly from the beginning of the present century, since when it has been so rapid that the rate for 1926–30 was little more than half that recorded for 1901-05.

Owing to differing climatic and developmental conditions, the separate states exhibit varying tendencies. For example, the West Australian mortality rose to its maximum in the period 1890–1900, the years of the gold rushes, when a rapid influx of population outstripped building and public health activities. Since 1900, however, the quinquennial rates show an unbroken improvement in every State.

Infantile Mortality, 1871 1930, *in Quinquennial Groups—Australia and New Zealand.*

Period.	Australia.						Australia	New Zealand.
	New South Wales.	Victoria	Queensland.	South Australia	West Australia.	Tasmania		
1871–75 ...	103·58	124·53	122·82	158·20	121·00	101·87	119·28	111·72
1876–80 ...	114·65	119·87	135·02	140·70	107·35	106·61	121·41	95·60
1881–85 ...	123·98	121·51	137·45	134·13	107·12	108·75	125·07	90·60
1886–90 ...	114·64	131·06	118·87	105·13	109·15	102·78	117·51	84·09
1891–95 ...	111·00	111·81	102·88	98·67	130·05	94·26	107·96	87·60
1896–1900	113·40	111·29	103·39	111·62	155·72	97·59	112·32	80·06
1901–05 ...	97·02	95·91	94·35	86·60	124·79	90·00	96·91	74·77
1906–10 ...	77·30	79·90	71·27	68·38	89·80	83·18	77·60	69·62
1911–15 ...	71·05	72·23	65·68	67·26	72·43	70·91	70·32	53·63
1916–20 ...	64·82	67·18	63·04	61·93	61·73	63·84	64·67	48·62
1921–25 ...	58·11	61·93	50·99	54·19	59·14	60·44	57·88	42·75
1926–30 ...	54·74	52·34	47·41	46·96	49·27	53·37	51·99	36·70

Relative data for New Zealand have been added for comparison. Even a casual glance will show that, favourable as has been the Australian experience in the present century, it still falls short of that of our neighbouring Dominion and of what may, and inevitably will, be accomplished in the Commonwealth.

2. *Seasonal Influence on Mortality.*

The vital statistics of Australia are tabulated according to registrations in calendar months. A greater interval is allowed for registration of births than for deaths, varying between the States from 42 to 60 days in the case of births, and from 8 to 30 days for deaths. Normally, deaths are registered much more promptly than births, but in Australia the operation of the Maternity Allowance Act of 1910 has had the effect of accelerating birth registration, until the average interval between birth and registration is about 11 days. It may therefore reasonably be assumed that the births and deaths registered in any given month occurred in an approximately identical period, and that only a slight inaccuracy would be perpetrated by basing the monthly infantile mortality rate on the births and deaths registered in the same month.

Computations indicate that the heaviest infantile mortality rate is experienced on the average in January (midsummer) and the lightest during September or October (spring), so that the table shows a general downward tendency from a maximum in January to a minimum in September or October, and then a very rapid rise throughout November and December.

Owing to differing climatic conditions (Australia extends over 33° of latitude) and the smaller populations, this regularity naturally does not exist in the various States. The maximum, however, invariably falls in the summer months, December to February, while the minimum may occur anywhere from June to November.

This seasonal arrangement is very remarkable when compared with that of New Zealand.

In that Dominion the maximum is located in the third quarter (late winter and early spring), while the minimum occurs in the first quarter (summer). This is diametrically opposite to Australian results, and is due to the virtual control of diseases of digestion as a cause of death in New Zealand, while, on the other hand, the maximum in the colder months is attributable in part at least to the relative severity of respiratory diseases.

The seasonal incidence of the deaths is influenced largely by the predominance in Australia of diarrhœal diseases, which attain their maximum virulence in the summer months. As these diseases are easily the most important, apart from those inseparable from the earliest period of infancy, the reason for the improvement in mortality in the summer months in successive quinquennia is obvious. The death-rate from convulsions is also at a maximum in the summer. Respiratory diseases are naturally more fatal in the colder months, while the mortality from malformations and "early infancy" is spread fairly uniformly throughout the year.

The vulnerability of the infant to the attacks of diseases at different stages of its life is also indicated in the table showing the percentage dying in various subdivisions of their first year in each calendar month :—

Percentage Dying and Mortality Rate in each Calendar Month 1921–30—Australia.

Calendar month.	Under 1 Week.	1 Week and under 1 Month	Total under 1 Month	1 Month and under 12 Months	Total.	Mortality Rate.
	Per cent.	Per cent.	Per cent	Per cent	Per cent	
January	33·2	9·7	42·9	57·1	100·0	65·59
February	33·9	10·1	44·0	56·0	100·0	61·11
March	36·8	10·2	47·0	53·0	100·0	56·32
April	38·6	11·5	50·1	49·9	100·0	57·20
May	41·1	13·4	54·5	45·5	100·0	54·81
June	43·7	15·6	59·3	40·7	100·0	54·09
July	43·5	17·2	60·7	39·3	100·0	54·66
August	42·4	17·8	60·2	39·8	100·0	54·87
September	42·4	17·0	59·4	40·6	100·0	49·61
October	46·1	14·5	60·6	39·4	100·0	46·47
November	45·2	12·0	57·2	42·8	100·0	49·10
December	41·6	10·0	51·6	48·4	100·0	56·24
Year ...	40·4	13·1	53·5	46·5	100·0	54·98

The variations in the monthly percentages for the various subdivisions of the first year are of considerable extent. Those in the "under 1 week" column are due to the predominant and fairly constant monthly mortality from malformation and "early infancy," which naturally shows more strongly in the months of the lightest infantile mortality, *i.e.* June to November. The same reason partly explains the changes in the balance of the first month, but here, in addition, the maximum influence of respiratory diseases is felt from June onwards. The movement in the balance of the year is due mainly to digestive diseases and convulsions, which claim most of their victims in the summer season.

3. *Distribution in Subdivisions of First Year of Life.*

The interest in the following table lies in the changes displayed in the succeeding quinquennia. In the first week the great majority of deaths is due to pre-natal causes, *i.e.* malformations, premature birth, etc., and it is ominous that there has been no improvement during the quarter of a century. In fact, the rates for the last period are higher than for the earliest. Investigations carried out in New Zealand dating from 1872 disclose little or no improvement in the mortality rate for the first week, while tabulations of individual Australian States which cover a longer term than the Commonwealth figures show that the rate for this early stage has remained practically stationary for very many years.

Once past the first week, however, the prospect of survival has increased with each quinquennian. For the balance of the first month the reduction from 10·16 per 1000 to 6·56 represents a 35 per

Infantile Mortality—Subdivisions of First Year, 1906–30—*Australia.*

Period.	Under 1 Week.	1 Week and under 1 Month.	Total under 1 Month.	1 Month and under 12 Months.	Total under 1 Year.
1906–10	21·19	10·16	31·35	46·25	77·60
1911–15	22·18	9·51	31·69	38·63	70·32
1916–20	23·10	8·59	31·69	32·98	64·67
1921–25	22·04	7·87	29·91	28·97	57·88
1926–30	22·39	6·56	28·95	23·04	51·99

cent. improvement, while the drop in the rest of the year from 46·25 to 23·04 almost equals a 50 per cent. gain.

It is perhaps relevant to this aspect of infantile mortality to draw attention to the operation of the Maternity Allowance of £5 which was first granted to mothers in October 1910. The employment of medical practitioners at confinements has been encouraged by this allowance. In the period October 1910 to June 1915, 64 per cent. of mothers were attended by doctors. This proportion has increased rapidly, until during the year ended June 1931, doctors were employed in 88 per cent. of confinements.

One is justified in assuming that the increased employment of doctors implies increased antenatal care of mothers, but it is significant that this has not been reflected in a decrease of the mortality rate for the first week of infancy.

4. *Causes of Death,* 1907–31.

The accompanying table sets out the changes in mortality rates for the principal causes of death. The great decrease in the rate has been due principally to conspicuous improvements in diseases of the digestive system, the rate for the most recent five years being little more than one-third of that for the first period in the table.

Other causes exhibiting substantial percentage reductions are tubercular diseases, syphilis, meningitis, convulsions and bronchitis.

On the other hand, broncho-pneumonia, pneumonia, and malformations have shown a distinct tendency to increase in fatality.

An important group, that of epidemic and endemic disease, has remained almost stationary throughout the whole period, this feature being characteristic of most of the individual diseases included in this group. The abnormally high rate for whooping cough in 1907–11 was due to a severe epidemic which visited New South Wales in 1907.

Malformations and "Early Infancy" have shown very little tendency to change in the period. Some vagaries in these rates are, however, due to changes in the classification, but the rates for the whole group are fairly comparable.

Compared with other countries, the total mortality rate for

Infantile Mortality Rates—Various Diseases, 1907–1930—*Australia and New Zealand (per* 1000 *Births).*

Cause.	Australia.					New Zealand. 1926–30.
	1907–10.	1911–15.	1916–20.	1921–25.	1926–30.	
Measles	0·23	0·41	0·22	0·16	0·22	0·04
Whooping cough	2·91	1·61	1·59	1·50	1·53	1·05
Diphtheria and croup ...	0·28	0·29	0·37	0·35	0·27	0·18
Influenza	0·34	0·24	0·42	0·25	0·24	0·41
Erysipelas	0·15	0·19	0·18	0·19	0·19	0·08
Total epidemic and endemic	4·00	2·82	2·87	2·61	2·76	1·83
Tuberculosis	0·92	0·55	0·40	0·31	0·32	0·41
Syphilis	0·99	0·77	0·57	0·36	0·26	0·13
Meningitis	1·67	1·80	1·08	0·98	0·56	0·35
Convulsions	3·65	2·31	1·74	1·23	0·72	0·61
Acute bronchitis	2·27	1·81	1·48	1·05	0·65	0·74
Broncho-pneumonia ...	2·56	2·58	2·71	3·12	3·30	2·35
Pneumonia	1·81	1·78	1·74	1·93	2·03	0·69
Total respiratory ...	7·12	6·58	6·21	6·39	6·19	4·07
Diarrhoea, enteritis ...	21·70	18·87	14·25	11·31	7·68	1·25
Total digestive ...	22·92	20·44	15·83	12·57	8·64	1·97
Malformations	2·77	3·37	3·85	3·99	4·44	4·89
Congenital debility, icterus sclerema, premature birth	23·76	24·01	24·48	21·74	19·84	16·79
Other diseases peculiar to early infancy (injury at birth)	1·76	4·24	4·76	5·22	5·53	3·06
Total	28·29	31·62	33·09	30·95	29·81	24·74
All other causes	6·68	3·43	2·88	2·48	2·73	2·61
Total all causes ...	76·24	70·32	64·67	57·88	51·99	36·72

Australia must be regarded as, on the whole, satisfactory, but that there is ample room for improvement in the majority of causes is obvious when the last column, which gives the New Zealand rates for the 1926–30 quinquennium, is studied.

Here again diarrhœa and enteritis attract attention, the New Zealand figure of 1·25 deaths per 1000 births being less than 1/6th of the Australian rate of 7·68. Without doubt climatic conditions go far to explain the difference, as they also perhaps help to account for the better showing of Australia in bronchitis and tuberculosis.

The unfavourable comparison with New Zealand in most of the other diseases provides evidence of the need for the extension of child welfare to embrace the whole of the continent.

The following table, showing the percentage of children dying from the principal causes of death at each subdivision of the first year, reveals in a striking manner the age incidence of these diseases.

Infantile Mortality—Causes of Death. Percentage Dying at Subdivisions of First Year—Australia, 1921–30.

Cause of Death.	Under 1 Week.	1 Week and under 1 Month.	Total under 1 Month.	1 Month and under 12 Months.	Total under 1 Year.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Whooping cough	0·02	0·88	0·23	5·65	2·75
Tuberculosis (all forms) ...	—	0·02	0·01	1·17	0·55
Syphilis	0·17	0·69	0·30	0·87	0·56
Convulsions	1·77	2·66	1·99	1·52	1·77
Bronchitis	0·17	2·54	0·75	2·47	1·55
Broncho-pneumonia	0·47	5·07	1·61	10·72	5·84
Pneumonia	0·45	3·11	1·11	6·48	3·60
Diarrhœa and enteritis ...	0·32	4·68	1·39	35·68	17·32
Hernia, intestinal obstruction	0·10	0·51	0·20	1·55	0·83
Malformation	9·23	11·64	9·82	5·16	7·66
Congenital debility, icterus sclerema	10·73	16·70	12·19	8·49	10·47
Premature birth	53·48	32·34	48·29	3·25	27·37
Injury at birth	7·98	2·87	6·72	0·19	3·69
Other diseases peculiar to early infancy	12·33	6·40	10·88	0·55	6·08
Other causes	2·78	9·89	4·31	16·25	9·96
Total deaths	100·00	100·00	100·00	100·00	100·00
Percentage on total deaths ...	40·41	13·14	53·55	46·45	100·00

5. *Masculinity of Infantile Deaths.*

The higher male birth rate and male infantile mortality rate are conspicuous permanent features of vital statistics, but the excess of the male over the female mortality rate is much greater than the excess of the male over the female birth rate.

For the last twenty-five years the percentage of the female to the male infantile mortality rate has been as follows:—

Male and Female Infantile Mortality Rate—Australia, 1906–30.

Period.	Infant Mortality Rate.			Percentage Female on Male Rate.		
	M.	F.	T.	Early Infancy.	Other Causes.	All Causes.
				Per cent.	Per cent.	Per cent.
1906–10 ...	84·78	70·02	77·60	81·93	83·02	82·59
1911–15 ...	77·65	62·65	70·32	78·77	82·34	80·68
1916–20 ...	71·63	57·31	64·67	79·33	80·68	80·01
1921–25 ...	64·23	51·21	57·88	78·43	81·38	79·73
1926–30 ...	57·66	45·99	51·99	78·33	81·05	79·76

A tabulation of the masculinity according to the subdivisions of the first year of life is even more remarkable, and shows that the females' risk of death is only 77·33 per cent. of that of males during the first week of life and 82·09 per cent. of that of males after the first month has passed.

Masculinity of Mortality Rates in Subdivisions of First Year—Australia, 1921–30.

Infantile Mortality Rate.	Under 1 Week	1 Week and under 1 Month.	Total under 1 Month.	1 Month and under 12 Months.	Total under 1 Year.
Males	24·97	8·04	33·01	27·98	60·99
Females	19·31	6·37	25·68	22·97	48·65
Percentage female on male rate	77·33	79 23	77·79	82·09	79·77

6. *Nuptial and Ex-Nuptial Children.*

In Australia the term " ex-nuptial " has for many years replaced the more usual term " illegitimate." Separate statistics of deaths in respect of these infants have only been kept since 1925, the results of which are shown below :—

Infantile Mortality Rates—Nuptial and Ex-nuptial Children—Australia, 1925–30

Age	Nuptial	Ex-nuptial.	Percentage Ex-nuptial on Nuptial Rate
Under 1 week	21·74	31·45	145
1 week and under 2 weeks	3·02	3·92	130
2 weeks and under 1 month ...	3·61	6·02	167
Total under 1 month	28·37	41·39	146
1 month and under 3 months ...	5·95	17 03	286
3 months and under 6 months ...	6·17	17·67	286
6 months and under 12 months ...	9·74	16·55	170
Total under 1 year	50·23	92·64	184

The less favourable conditions often surrounding the unmarried mother before and at birth result in a 45 per cent. higher mortality of children in the first week. This disparity between the ex-nuptial and nuptial rates decreases to 30 per cent. for the second week of life, but thereafter rises rapidly to a maximum of 186 per cent. during the period one month and under six months. During this period most of the epidemic and digestive diseases exact their heaviest toll, and the above rates are therefore eloquent of the effects of the deprivation of the ex-nuptial child of the best and healthiest conditions which should be the birthright of every infant.

The very remarkable incidence variation in the principal diseases is seen from the following table :—

Infantile Mortality Rates for Various Diseases—Australia,
1925–30.

	Nuptial Children.	Ex-nuptial Children
Whooping cough	1·65	1·80
Tuberculosis (all forms)	0·32	0·24
Syphilis	0·21	1·37
Convulsions	0·71	1·34
Acute bronchitis	0·67	0·67
Broncho-pneumonia	3·17	6·80
Pneumonia	1·93	3·14
Diarrhœa and enteritis	7·10	20·84
Malformations	4·35	4·65
Congenital debility, icterus sclerema	4·78	10·37
Premature birth	14·43	24·17
Injury at birth	2·64	2·98
Other diseases of early infancy	2·92	2·87
All other diseases	5·35	11·40
Total all diseases	50·23	92·64

Only in tuberculosis, acute bronchitis and other diseases of early infancy are the rates for ex-nuptial lower than those for nuptial children. In some cases, particularly syphilis, and diarrhœa and enteritis, the disparities are very remarkable, and strongly emphasize the handicaps which hamper these unfortunate children. The excess mortality in the remaining causes confirms the disadvantage of the ex-nuptial child in early infancy.

7. *Infantile Mortality in Tropical Areas.*

The influence of latitude on infantile mortality is always of interest. Very high rates are often experienced in tropical climates, but that low latitudes are not necessarily inimical to the welfare of infants is conclusively proved by the experience of Queensland, a large portion of which lies within the tropics.

A tabulation has been made of the infantile mortality for the tropical and non-tropical portions of Queensland, the results of which prove decisively that there is very little if any inherent disadvantage in the tropical conditions existing in Queensland.

Over the whole twenty-five years the average rates were practically identical, that for tropical Queensland being 58·98 deaths per 1000 births and for non-tropical 58·60. Throughout the period the annual rates for Queensland as a whole exceeded those for the

Infantile Mortality Rates—Queensland, 1906–30.

Period	Tropical Portion	Non-tropical Portion.	Percentage Tropical on Non-tropical Rate
			Per cent.
1906–10	71·38	71·77	99·46
1911–15	65·81	65·63	100·27
1916–20	61·30	63·68	96·26
1921–25	51·15	50·94	100·41
1926–30	50·36	46·27	108·84
Whole period	58·98	58·60	100·65

Commonwealth once only, while those for the tropical portion of Queensland are greater than those for the Commonwealth on seven occasions only. South Australia is the only State which can approach these excellent results.

8. *Stillbirths*.

The significance of stillbirths in relation to infantile mortality was strikingly illustrated in the case of New Zealand in an article in the *Journal of the Royal Statistical Society* for 1929. It is unfortunate that stillbirths are not registered throughout Australia, consequently complete information is not available.

Compulsory registration of stillbirths has, however, been in force in Western Australia for many years. In the last five quinquennia the results have been as follows :—

Stillbirths—Number per 100 *Live Births* 1906–30—*Western Australia.*

Period.	Male	Female.	Total.	Percentage of Females on Male Rate.
				Per cent.
1906–10	3·26	2·61	2·94	80·06
1911–15	3·46	2·87	3·17	82·95
1916–20	3·29	2·80	3·05	85·11
1921–25	3·34	2·65	3·00	79·34
1926–30	2·86	2·73	2·80	95·45

The total rate has shown a continuous decline since 1911–15, but the movement for the sexes separately is irregular. The pronounced decrease in the male rate and the increase in the female rate for the last quinquennium which were reflected very conspicuously in the increased ratio of the female to the male rate were due entirely to abnormal results for 1930, when the female stillbirths greatly exceeded the male.

9. *Child Welfare.*

Credit for the decrease in infantile mortality in Australia is largely due to the activities of the Baby Health Centres and the Bush Nursing Association.

There were in 1930 over 300 of the former, of which over 170 were in the metropolitan areas and 129 in the larger country centres. Attendances of babies at these centres exceeded 900,000, and, in addition, the nurses paid over 230,000 visits to homes.

Bush nursing centres, which, as the name implies, are located in the rural districts, numbered 169, and new centres are being established.

10. *Conclusion.*

It is probable that for some years to come infantile mortality will continue to decline, there still being room for improvement in each individual cause. As in New Zealand, however, the rate of improvement will tend to slacken.

The efforts of the infant welfare associations can be depended on to exert an increasingly beneficial influence, while no doubt public health measures will gain more control over epidemic and endemic diseases.

On the other hand, there has been little evident response to the attention devoted to the pre-natal care of the mother, and it is only by solving this problem that the mortality rate can be further substantially reduced.

It may be, as suggested in the article on New Zealand referred to above, that the increased ante-natal care has enabled many conceptions to attain a full development and birth to a precarious existence which under former conditions would not have reached maturity, or which would have been stillborn. In the absence of relevant statistics, it is, however, impossible to reach any conclusion on this aspect of the subject.

DISTRIBUTION OF THE COEFFICIENT OF VARIATION AND THE EXTENDED "*t*" DISTRIBUTION.

By A. T. MCKAY, M.Sc.

Introduction.

IN a recent paper * by the present author there was given a brief consideration of the approximate distribution of the estimated coefficient of variation which has lately been found by E. S. Pearson to be defective. The present paper aims at remedying this, though it has not been possible to find theoretically the precise degree of error in the approximation found. This difficulty has, however, been overcome to some extent by the direct, but nevertheless arduous, method of numerical test. The latter investigations, without which the theoretical results of this section could not be used with confidence, have been carried out by E. S. Pearson and E. C. Fieller, and appear concurrently with the present paper.

Further, by making use of the results for the coefficient of variation it has been possible to show the approximate distribution of "*t*" for cases in which the mean is distant more than (say) three standard deviations from the origin about which the deviations are taken.

I. *The Coefficient of Variation.*

The distribution of the mean and root mean square deviation for samples of n from a normal population defined by the parameters m and σ are respectively :

$$\left(\frac{n}{2\pi\sigma^2}\right)^{\frac{1}{2}} . e^{-(\bar{x}-m)^2/2\sigma^2} . \delta\bar{x} \text{ and } \left(\frac{n}{2\sigma^2}\right)^{\frac{n-1}{2}} . \frac{\sqrt{2}s^{n-2}e^{-ns^2/2\sigma^2} . \delta s}{\Gamma\left(\frac{n-1}{2}\right)} \quad . \quad (1)$$

Let the estimated coefficient of variation be designated by $v = s/|x|$, then the distribution of v is given by :

$$p_v\delta v = \left(\frac{n}{\sigma^2}\right)^{n/2} . \frac{v^{n-2}\delta v}{2^{\frac{n-1}{2}}\sqrt{\pi}\,\Gamma\left(\frac{n-1}{2}\right)} . \int_{-\infty}^{\infty} |x|^{n-1} e^{-n[v^2x^2+(x-m)^2]/2\sigma^2} dx \quad (2)$$

$$= \frac{v^{n-2}e^{-a^2v^2/2(1+v^2)}\delta v\Gamma(n)}{2^{\frac{n-3}{2}}\Gamma\left(\frac{n-1}{2}\right)(1+v^2)^{n/2}}\left[\frac{1}{\sqrt{2\pi}}\int_0^{\infty}\frac{x^{n-1}}{\Gamma(n)}\left(e^{-\frac{1}{2}(x-a/(1+v^2)^{\frac{1}{2}})^2} + e^{-\frac{1}{2}(x+a/(1+v^2)^{\frac{1}{2}})^2}\right)dx\right] \quad . \quad . \quad (3)$$

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* *Jour. Roy. Stat. Soc.*, XCIV, Part IV, 1931.

where $a = m\sqrt{n}/\sigma$. Write the quantity in square brackets equal to

$$I_{n-1}(a/(1+v^2)^{\frac{1}{2}}) + I_{n-1}(-a/(1+v^2)^{\frac{1}{2}})$$

and transform the variable v to t by means of the relation $t^2 = a^2v^2/(1+v^2)$. Thus we have:

$$p_t\delta t = \frac{T\,.\,\Gamma(n)}{a^{n-2}}\left\{(a^2-t^2)^{-\frac{1}{2}}I_{n-1}[(a^2-t^2)^{\frac{1}{2}}] + (a^2-t^2)^{-\frac{1}{2}}I_{n-1}[-(a^2-t^2)^{\frac{1}{2}}]\right\} \quad . \quad . \quad (4)$$

where $T = e^{-t^2/2}t^{n-2}\delta t/2^{\frac{n-3}{2}}\,.\,\Gamma\left(\frac{n-1}{2}\right)$. Referring to the B.A. Mathematical Tables * it will be seen that (4) can be expanded in the convergent series:

$$p_t\delta t = \frac{T\,.\,2^{-(n-1)/2}\,.\,\Gamma(n)}{a^{n-2}\Gamma\left(\frac{n+1}{2}\right)}\,.\,\left\{\frac{1}{(a^2-t^2)^{\frac{1}{2}}} + \frac{(n-1)}{2\,!}(a^2-t^2)^{\frac{1}{2}} + \frac{(n-1)(n-3)}{4\,!}(a^2-t^2) + \ldots\right\} \quad (5)$$

Now it may be shown that:

$$x^m = \frac{\Gamma(m+1)}{2\pi i}\int_L \frac{e^{zx}}{z^{m+1}}\,.\,dz \quad . \quad . \quad . \quad . \quad (6)$$

where L is a contour in the z-plane that starts at $-i\infty$, passes the origin on the right and ends at $+i\infty$. Writing $(a^2-t^2) = x$ in equation (5) and employing the property expressed in equation (6) and finally making the obvious summation, it may be shown that:

$$p_t\delta t = \frac{T\,.\,2^{-(n-1)/2}\sqrt{\pi}\,.\,\Gamma(n)}{a^{n-2}\Gamma\left(\frac{n+1}{2}\right)2\pi i}\int_L e^{z(a^2-t^2)}\,(1+1/2z)^{(n-1)/2}\,\frac{dz}{\sqrt{z}} \quad (7)$$

or

$$p_t\delta t = \frac{T\,.\,\Gamma(n/2)}{2^{-(n/2-1)}\,.\,2\pi i}\int_L e^{z(1-t^2/a^2)/2}\,\frac{(1+z/a^2)^{(n-1)/2}}{z^{n/2}}\,dz \quad (8)$$

Now from equation (6) writing $x = \frac{1}{2}$ and $(m+1) = n/2$ we see that:

$$1/\Gamma(n/2) = \frac{2^{n/2-1}}{2\pi i}\int_L \frac{e^{z/2}}{z^{n/2}}\,dz \quad . \quad . \quad . \quad . \quad (9)$$

for which the point $z = n$ is a "saddle point" of the integrand; thus deforming the path L to path M (the path of steepest descent),†

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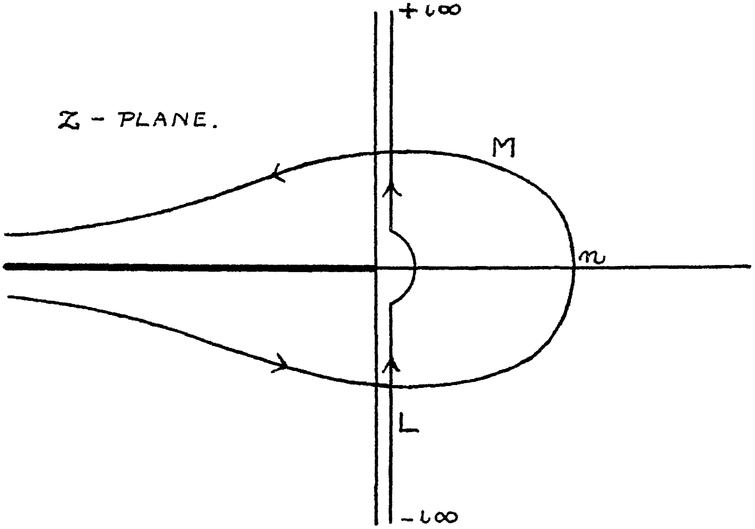
* *British Association Mathematical Tables*, Vol. I, 1931, Introduction, p. xxix.

† H. Jeffreys, *Cam. Tracts in Mathematics*, No. 23, pp. 77–79.

as is obviously permissible, the chief contributions to the integral are those on the arc near and passing through the point $z = n$. If we were concerned to do so, this line of reasoning would enable us to deduce the first Stirling approximation to $\Gamma(n/2)$. Let us return to equation (8) and write it:

$$p_t\delta t = T2^{(n/2-1)}\frac{\Gamma(n/2)}{2\pi i}\int_M \left[e^{-zt^2/2a^2}(1+z/a^2)^{(n-1)/2}\right]\frac{e^{z/2}}{z^{n/2}}\,dz \quad . \qquad (10)$$

Now the quantity in square brackets varies much more slowly with z than the remaining term, so there should be no serious error in taking



it constant and equal to its value at the saddle point $z = n$ of the remaining term. This leads to the result:

$$p_t\delta t = Te^{-nt^2/2a^2}(1+n/a^2)^{(n-1)/2} \quad . \quad . \quad . \qquad (11)$$

Substituting in the values of T and a, and changing the variable by means of $\chi = t(1+\sigma^2/m^2)^{\frac{1}{2}}$ we deduce

$$p_\chi\delta\chi = \frac{e^{-\chi^2/2}\chi^{n-2}}{2^{\frac{n-3}{2}}\Gamma\left(\frac{n-1}{2}\right)}\cdot\delta\chi \quad . \quad . \quad . \quad . \qquad (12)$$

The range for χ^2 is obviously from 0 to $n(m^2/\sigma^2+1)$, not 0 to ∞, as is required to make the integral probability unity. If, however, m/σ is large enough—say greater than 3 (*i.e.* the coefficient of variation of the parent population is less than 33 per cent.)—the discrepancy is of no importance, and we may conclude that $nv^2(m^2/\sigma^2+1)/$

$(1 + v^2)$ is approximately distributed as χ^2 with $(n - 1)$ degrees of freedom.

II. *The Extended "t" Distribution.*

Let b be any fixed value of the variable such that $(b - m)/\sigma = \tau$ and $(b - \bar{x})/s = t$, thus t is the ratio of the sample mean from a point other than the population mean to the standard deviation of the sample. It has been shown by R. A. Fisher * that the distribution of t is given by:

$$q_t \delta t = \frac{\Gamma(n) \, . \, e^{-n\tau^2/2(1+t^2)} \delta t}{2^{\frac{n-3}{2}} \Gamma\left(\frac{n-1}{2}\right) (1+t^2)^{n/2}} I_{n-1}(-\tau t\sqrt{n}/(1+t^2)^{\frac{1}{2}}) \quad . \quad (14)$$

If $b = m$, *i.e.* $\tau = 0$, the above expression reduces to "Student's" distribution. In general, let the variable t be changed to u by the transformation $n\tau^2/(1 + t^2) = u^2$, whence we derive:

$$q_u \delta u = \frac{\Gamma(n) u^{n-2} \, . \, e^{-u^2/2} \, . \, \delta u}{2^{\frac{n-3}{2}} \Gamma\left(\frac{n-1}{2}\right) (n\tau^2)^{\frac{n-2}{2}} (n\tau^2 - u^2)^{\frac{1}{2}}} I_{n-1}(-[n\tau^2 - u^2]^{\frac{1}{2}}) \quad (15)$$

Now in general $I_n(x)$ is small compared with $I_n(-x)$, thus no great error will be made by adding the complementary term in equation (15). When this is done the modified equation (15) is seen to be identical in form with equation (4). Without proceeding any further, we may conclude that provided $\tau \geqslant 3$ the expression $n(1 + \tau^2)(1 + t^2)$ is approximately distributed as χ^2 with $(n - 1)$ degrees of freedom.

* *British Association Mathematical Tables, loc. cit.*, p. xxxi.

A NUMERICAL TEST OF THE ADEQUACY OF A. T. McKAY'S APPROXIMATION.

By E. C. FIELLER.

(1) *Discussion of the Tables.*

AT E. S. Pearson's suggestion I have prepared the following tables, which indicate the efficiency of McKay's approximation.

Tables I*a* and I*b* give, for samples of six drawn from a parent population in which $\tilde{v} = \frac{1}{3}$, the tail areas of:

(i) the true distribution of the proportional coefficient of variation.
(ii) McKay's approximation to this distribution.

Tables II*a* and II*b* give the corresponding information for samples of eighteen drawn from the same population.

The tables show that in these particular cases the approximation, while not mathematically accurate, is nevertheless quite adequate for any practical purpose. It may, I think, be taken that the agreement improves as we decrease $\tilde{v}$ or increase n; in the majority of cases n will not be much smaller than 6, or $\tilde{v}$ larger than $\frac{1}{3}$, so that the figures in Tables I*a* and I*b* may be taken as a measure of the maximum error involved in using the χ^2 tables in the way that McKay suggests.

TABLE I.

Case $\tilde{v} = \frac{1}{3}$, $n = 6$.

(*a*) Chance of Sample with Smaller r.			(*b*) Chance of Sample with Larger r.		
r.	True Value.	χ^2 Theory.	r.	True Value.	χ^2 Theory.
0·15	0·062	0·067	0·48	0·053	0·048
0·14	0·047	0·051	0·51	0·034	0·030
0·13	0·034	0·037	0·54	0·022	0·019
0·12	0·024	0·026	0·57	0·013	0·012
0·11	0·017	0·018	0·60	0·008	0·007
0·10	0·011	0·012	0·63	0·005	0·004
0·09	0·007	0·007	0·66	0·003	0·003
0·08	0·004	0·004	0·69	0·002	0·002
0·07	0·002	0·002	0·72	0·001	0·001
0·06	0·001	0·001	0·75	0·001	0·001

TABLE II.

Case $\bar{v} = \frac{1}{3}$, $n = 18$.

(*a*) (*b*)

Chance of Sample with Smaller v.			Chance of Sample with Larger v.		
v.	True Value.	χ^2 Theory.	v.	True Value.	χ^2 Theory.
0·24	0·084	0·088	0·42	0·060	0·058
0·23	0·058	0·061	0·43	0·046	0·044
0·22	0·038	0·040	0·44	0·035—	0·033
0·21	0·024	0·026	0·45	0·026	0·024
0·20	0·014	0·015+	0·46	0·019	0·018
0·19	0·008	0·009	0·47	0·014	0·013
0·18	0·004	0·005—	0·48	0·010	0·009
0·17	0·002	0·002	0·49	0·007	0·007
0·16	0·001	0·001	0·50	0·005—	0·005—
			0·51	0·003	0·003
			0·52	0·002	0·002
			0·53	0·002	0·002
			0·54	0·001	0·001
			0·55	0·001	0·001

(2) *Calculation of the Tables.*

The areas in Tables I and II were obtained by approximate quadrature from the ordinates of the distributions. The ordinate of the true distribution of v is :

$$f(v) = \frac{(n-1)!}{\sqrt{2\pi}\,2^{\frac{n-3}{2}}\,\Gamma\left(\frac{n-1}{2}\right)} \frac{v^{n-2}}{(1+v^2)^{\frac{n}{2}}} e^{-\frac{1}{2}\frac{a^2v^2}{1+v^2}} \left\{ Hh_{n-1}\left(-\frac{a}{(1+v^2)^{\frac{1}{2}}}\right) + Hh_{n-1}\left(+\frac{a}{(1+v^2)^{\frac{1}{2}}}\right)\right\} \quad . \quad . \quad (1)$$

where the population sampled is :

$$df = \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{1}{2}\left(\frac{x-m}{\sigma}\right)^2} dx \; . \; . \; . \; . \; . \; . \quad (2)$$

$$a = \frac{m\sqrt{n}}{\sigma} \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \quad (3)$$

and
$$Hh_t(x) = \frac{1}{t!}\int_0^\infty y^t e^{-\frac{1}{2}(x+y)^2} dy \; . \; . \; . \; . \; . \; . \quad (4)^*$$

The ordinate of McKay's approximate distribution is :

$$\phi(v) = \frac{a^{n-1}(1+\sigma^2/m^2)^{\frac{n-1}{2}}}{2^{\frac{n-3}{2}}\,\Gamma\left(\frac{n-1}{2}\right)} \frac{v^{n-2}}{(1+v^2)^{\frac{n+1}{2}}} e^{-\frac{1}{2}\frac{a^2v^2}{1+v^2}\left(1+\frac{\sigma^2}{m^2}\right)} \quad . \quad . \quad (5)$$

thus the logarithms of the two ordinates can easily be computed, when we know the integrals $Hh_{n-1}\left(-\frac{a}{(1+v^2)^{\frac{1}{2}}}\right)$ and $Hh_{n-1}\left(+\frac{a}{(1+v^2)^{\frac{1}{2}}}\right)$. Whatever the value of n, the latter integral is small enough to be neglected; the former, in the case of Tables I, fell within the range of the tables * issued by the British Association, and in the case of Tables II, was calculated from the following approximation:

$$t!\,Hh_t(-x) = \sqrt{2\pi}\,\mu^{t+1}\nu e^{-\frac{1}{2}\left(\frac{t}{\mu}\right)^2} P(\nu) \quad . \quad . \quad . \qquad . \quad . \quad . \quad (6)$$

$$\text{where} \quad \mu = \frac{x}{2} + \sqrt{t + \frac{x^2}{4}} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (6{\cdot}1)$$

$$\nu = (t + \mu^2)^{-\frac{1}{2}} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (6{\cdot}2)$$

$$\begin{aligned}\text{and} \quad P(\nu) = 1 &- \tfrac{3}{4}t\,.\,\nu^4 + \tfrac{5}{6}t(t-3)\nu^6 + \tfrac{7}{32}t(47t-60)\nu^8 \\ &- \tfrac{3}{40}t(175t^2 - 1377t + 1260)\nu^{10} \\ &+ \tfrac{11}{1152}t(560t^3 - 31059t^2 + 120564t - 90720)\nu^{12} \quad (6{\cdot}3)\end{aligned}$$

To establish this result, we note that $y = \mu$ is the mode of the integrand in

$$t!\,Hh_t(-x) = \int_0^\infty y^t e^{-\frac{1}{2}(y-x)^2} dy;$$

transferring to the mode as origin, we have:

$$t!\,Hh_t(-x) = \int_{-\mu}^\infty (y+\mu)^t e^{-\frac{1}{2}\left(y+\frac{t}{\mu}\right)^2} dy,$$

and the logarithm of the integrand is now:

$$t\log(y+\mu) - \frac{1}{2}\left(y + \frac{t}{\mu}\right)^2 = t\log\mu + t\log\left(1 + \frac{t}{\mu}\right) - \frac{1}{2}\left(y + \frac{t}{\mu}\right)^2$$

If x or t be large enough, μ will be large, and in the neighbourhood of the origin, the region that makes the major contribution to the integral, we may express this logarithm in the form:

$$t\log\mu - \frac{1}{2}\left(\frac{t}{\mu}\right)^2 - \frac{1}{2}y^2\left(1 + \frac{t}{\mu^2}\right) + t\left(\frac{1}{3}\frac{y^3}{\mu^3} - \frac{1}{4}\frac{y^4}{\mu^4} + \frac{1}{5}\frac{y^5}{\mu^5} \; . \; . \; .\right)$$

---

* In McKay's notation $Hh_t(x) = \sqrt{2\pi}\,I_t(x)$. The properties of this function are discussed in the *British Association Mathematical Tables*, Vol. I, pp. xxiv–xxxv. Both notations are there used.

giving for the integrand:

$$\mu^t e^{-\frac{1}{2}\left(\frac{t}{\mu}\right)^2} e^{-\frac{1}{2}y^2\left(1+\frac{t}{\mu^2}\right)} \left[1 + \frac{t}{3}\frac{y^3}{\mu^3} - \frac{t}{4}\frac{y^4}{\mu^4} + \frac{t}{5}\frac{y^5}{\mu^5} - \left(\frac{t}{6} - \frac{t^2}{18}\right)\frac{y^6}{\mu^6} \right.$$
$$+ \left(\frac{t}{7} - \frac{t^2}{12}\right)\frac{y^7}{\mu^7} - \left(\frac{t}{8} - \frac{47t^2}{480}\right)\frac{y^8}{\mu^8}$$
$$+ \left(\frac{t}{9} - \frac{19t^2}{180} + \frac{t^3}{162}\right)\frac{y^9}{\mu^9} - \left(\frac{t}{10} - \frac{153t^2}{1400} + \frac{t^3}{72}\right)\frac{y^{10}}{\mu^{10}}$$
$$+ \left(\frac{t}{11} - \frac{31t^2}{280} + \frac{31t^3}{1440}\right)\frac{y^{11}}{\mu^{11}}$$
$$\left. - \left(\frac{t}{12} - \frac{3349t^2}{30240} + \frac{493t^3}{17280} - \frac{t^4}{1944}\right)\frac{y^{12}}{\mu^{12}} + \dots \right]$$

The integral $t!\,Hh_t(-x)$ can now be expressed in terms of incomplete normal moment functions; for, ν being given by (6·2),

$$\int_{-\mu}^{\infty} \frac{1}{\sqrt{2\pi}} y^s e^{-\frac{1}{2}\left(1+\frac{t}{\mu^2}\right)y^2} dy = (\mu\nu)^{s+1} \int_{-1/\nu}^{\infty} \frac{1}{\sqrt{2\pi}} u^s e^{-\frac{1}{2}u^2} du$$
$$= (\mu\nu)^{s+1} \left[\int_0^{\infty} \frac{1}{\sqrt{2\pi}} u^s e^{-\frac{1}{2}u^2} du + (-1)^s (s-1)(s-3) \dots m_s(1/\nu) \right]$$

In the cases with which we are concerned, however, the limit $1/\nu$ is so large that we may neglect the integrals $\int_{-\infty}^{-1/\nu} \frac{1}{\sqrt{2\pi}} u^s e^{-\frac{1}{2}u^2} du$ and take $\int_{-\mu}^{\infty} y^s e^{-\frac{1}{2}\left(1+\frac{t}{\mu^2}\right)y^2} dy = 0$ or $\sqrt{2\pi}\,1.3 \dots (s-1)(\mu\nu)^{s+1}$, according as s is odd or even.

Using these values, we obtain the result (6) given above.

COMPARISON OF A. T. McKAY'S APPROXIMATION WITH EXPERIMENTAL SAMPLING RESULTS.

By E. S. PEARSON, D.Sc.

THE numerical test provided by E. C. Fieller is clearly more conclusive than any experimental result; but as the need for a correction to A. T. McKay's original approximation was only discovered by the test of experiment, it seems to be worth placing the following results on record.

The data, which were obtained in connection with another investigation, consisted of 200 random samples of, (1) $n = 6$, (2) $n = 12$, and (3) $n = 18$, drawn from a normal population in which the group breadth was $\frac{1}{10}$th the standard deviation. By adjustment of the origin these could be considered as samples from a population in which the coefficient of variation was either, (*a*) $\bar{v} = 0{\cdot}05$, or, (*b*) $\bar{v} = 0{\cdot}3\dot{3}$.* Table I shows in comparison the observed frequency distributions of sample v's and the corresponding theoretical frequencies obtained by assuming that,

$$n(1 + 1/\bar{v}^2)\frac{v^2}{1 + v^2},$$

is distributed as χ^2 with $(n - 1)$ degrees of freedom. The results of applying in each case the test for goodness of fit of theory to observation are shown in Table II. It appears just possible to trace the slight discrepancy indicated by Fieller's work—namely, that McKay's approximation allows for somewhat too few high values and too many low values of v. But the agreement is on the whole very satisfactory.

TABLE II.

Tests of Goodness of Fit.

	Samples of 6.		Samples of 12.		Samples of 18.	
	$\bar{v} = 0{\cdot}05$	$\bar{v} = 0{\cdot}3\dot{3}$.	$\bar{v} = 0{\cdot}05$.	$\bar{v} = 0{\cdot}3\dot{3}$	$\bar{v} = 0{\cdot}05$	$\bar{v} = 0{\cdot}3\dot{3}$.
χ^2	7·99	15·44	14·90	15·02	14·33	19·63
Degrees of freedom	11	18	14	15	16	21
P	0·714	0·631	0·385	0·450	0·574	0·545

---

* This means that for a given sample size, n, cases (*a*) and (*b*) are not independent.

TABLE I.

Samples of 6						Samples of 12						Samples of 18					
$\sigma = 0·05$			$v = 0·33$			$\sigma = 0·05$			$v = 0·33$			$\sigma = 0·05$			$v = 0·33$		
s	Obs	Theor	v	Obs	Theor	s	Obs	Theor	v	Obs	Theor	s	Obs	Theor	v	Obs	Theor
<0·015	3	1·9	<0·10	2	2·4	<0·0255	1	2·2	0·16	1	1·8	<0·0305	—	2·6	<0·20	2	3·1
0·015–0·020	2	5·0	0·10–0·12	1	2·9	0·0255–0·0285	2	3·3	0·16–0·18	2	3·0	0·0305–0·0325	2	2·6	0·20–0·21	1	2·1
0·020–	15	10·6	0·12	2	4·9	0·0285	5	6·2	0·18	5	5·6	0·0325	6	4·3	0·21–	4	3·0
0·025–	10	17·3	0·14	7	7·2	0·0315–	11	10·1	0·20–	7	9·2	0·0345	5	6·6	0·22–	2	4·1
0·030–	23	23·1	0·16	6	9·6	0·0345–	12	14·6	0·22–	17	13·1	0·0365	10	9·4	0·23–	2	5·4
0·035–	35	27·3	0·18–	10	12·0	0·0375–	14	18·9	0·24	17	17·3	0·0385–	15	12·3	0·24–	10	6·9
0·040	28	27·[illegible]	0·20	12	13·9	0·0405–	27	22·0	0·26–	20	20·3	0·0405–	14	15·1	0·25–	12	8·4
0·045	26	25·1	0·22	19	15·1	0·0435	22	23·5	0·28–	16	21·6	0·0425–	19	17·4	0·26–	13	9·8
0·050–	19	20·8	0·24	21	16·0	0·0465	25	22·9	0·30	19	21·5	0·0445–	28	18·7	0·27–	11	11·1
0·055–	11	15·5	0·26–	11	16·1	0·0495–	22	20·6	0·32–	16	19·8	0·0465–	24	19·2	0·28–	15	12·1
0·060–	10	10·6	0·28–	18	15·4	0·0525–	13	17·1	0·34–	21	17·2	0·0485–	15	18·4	0·29–	11	12·8
0·065–	7	6·6	0·30	7	14·3	0·0555–	20	13·3	0·36–	15	14·0	0·0505–	12	16·8	0·30–	20	13·2
0·070–	2	3·9	0·32–	15	12·9	0·0585–	5	9·6	0·38–	13	10·9	0·0525–	10	14·5	0·31–	10	13·2
0·075–0·080	3	2·0	0·34	12	11·2	0·0615–	5	6·5	0·40–	7	8·0	0·0545–	13	11·9	0·32–	17	12·8
>0·080	3	1·8	0·36	7	9·6	0·0645–	8	4·1	0·42–	4	5·7	0·0565–	7	9·4	0·33–	8	12·1
			0·38	7	8·0	0·0675–0·0705	5	2·4	0·44–	5	3·9	0·0585–	6	7·0	0·34–	9	11·2
			0·40	10	6·5	>0·0705	3	2·7	0·46–	8	2·6	0·0605–	4	5·0	0·35–	11	10·1
			0·42–	6	5·2				0·48–0·50	1	1·7	0·0625–	7	3·4	0·36–	8	9·0
			0·44–	1	4·1				>0·50	3	2·8	0·0645–0·0665	1	2·2	0·37–	3	7·7
			0·46–	4	3·2							>0·0665	2	3·2	0·38–	5	6·6
			0·48–	4	2·1										0·39–	5	5·5
			0·50	2	1·8										0·40	6	4·5
			0·52–	1	1·4										0·41–0·42	4	3·6
			0·54–0·56	2	1·0										0·42–0·44	5	5·1
			>0·56	4	2·7										0·44–0·47	4	3·9
															>0·47	2	2·7
Totals	200	200·0		200	200·0		200	200·0		200	200·0		200	200·0		200	200·0

REPORT OF THE COUNCIL

For the FINANCIAL YEAR *ended December* 31, 1931, *and for the* SESSIONAL YEAR *ending June* 21, 1932, *presented at the* NINETY-EIGHTH ANNUAL GENERAL MEETING *of the* ROYAL STATISTICAL SOCIETY, *held in the Hall of the Royal Society of Arts, John Street, Adelphi, W.C.* 2, *on June* 21, 1932.

THE Council have the honour to submit their Ninety-eighth Annual Report.

The roll of Ordinary Fellows on December 31 last, as compared with the average of the previous ten years, was as follows :—

Particulars.	1931.	Average of the previous Ten Years.
Number of Fellows at end of previous year... ...	1,058	1,011
Number lost by death, withdrawal, or default ...	56	53
New Fellows elected	62	70
Number of Fellows on December 31	1,064	1,028

Since December 31st last, 25 new Fellows have been elected or restored to the list, and the Society has lost 69 by death, resignation, or default, so that the number on the list, excluding 24 Honorary Fellows, on June 21, 1932, is 1,020.

Since June, 1931, the Society has lost by death the undermentioned Fellows :—

		Date of Election.
	Apperley, Henry Wellsteed	1919
	Bell, Sir Hugh, Bart., C.B.	1919
	Clark, Stanley	1930
	*Croshaw, Francis P.	1921
	Fremantle, Prof. Henry E. S.	1902
	Gallimore, Ernest Spencer, A.I.S.A.	1927
	Griffin, George Herbert	1911
c d p	Guild, James Bennett, M.B.E., M.A.	1915
d	Harrison, C. W. Francis	1909
	Jones, David T.	1914
d	Rea, Peter Mackenzie	1910
	*Smith, Charles	1906
c p	*Somerville, Sir William, K.B.E., M.A., D.Sc.	1900
	*Williams, Major C. Woolmer	1896

c Has served on Council. *d* Donor to the Library.
p Contributed a Paper or Papers. * Life Fellow.

Representatives of Corporate Bodies:

Kirkaldy, Prof. A. W., M.A., *representing* The Faculty of Economics and Commerce, University College, Nottingham.
Locking, Norman, *representing* Lever Brothers, Ltd.

Honorary Fellow.

Falbe-Hansen, Prof. Vigand Andreas, *elected* 1878.

The Council, in common with all who knew him, felt a deep and especial regret at the loss of Sir Hugh Bell, who, in spite of his years, never ceased to play an active part in public affairs or to take an interest in the work of the Society. Little more than a month before his death, last June, at the age of eighty-seven, Sir Hugh made a characteristically penetrating and lively contribution to the discussion, before the Society, of Dr. Rhodes's paper on the Coal Mining Industry. An obituary notice was published in last year's *Journal.*

The death of Mr. J. B. Guild, after several months' illness, at the early age of forty-one, was also greatly deplored. Mr. Guild had been a Fellow for nearly seventeen years, had served on the Council, read a paper before the Society, and, for nearly twelve years, made regular contributions to the current notes in the *Journal.* A brief account of his connection with the Society was given in Part II of this year's *Journal* (Vol. 95, p. 371).

Sir William Somerville, Professor Emeritus of Rural Economy in the University of Oxford since 1926, and sometime Assistant Secretary at the Board of Agriculture and Fisheries, joined the Society 32 years ago. He served on the Council from 1909 to 1912, and in the former year read a paper on "Forestry in some of its Economic Aspects."

Professor Falbe-Hansen, who was elected an Honorary Fellow in 1878, died at the age of 90 in March last. A note regarding him appears on p. 759.

Since June, 1931, the following new Fellows have been elected:—

Antia, Faridon Phiros, Ph.D.(Econ.).
Barger, Harold, B.A.
Beckett, Rowland Ewart, F.L.A.A.
Beynon, Thomas John.
Biddle, Frank Henry.
Chaudhuri, Hariprasad.
Chitts, Mervyn Hugh Gordon.
Collier, George Metcalfe.
Craik, George Livingston.
Cushing, Gordon.
Dabké, Balvant Shankar, B.Com.
Dampier, Sir William, F.R.S., Sc.D.
Daruwala, Nadir Ardeshir, B.Com.
Edmonds, Karl.
El-Darwish, Mahmoud Mohemmed, B.Sc.(Econ.).
Gampell, Sydney S.
Gollop, Leslie John, B.Sc.
Ineson, William James Lawson.
Kellett, Ronald Gustave.
Lanphier, Hugh Somerville.
Leak, Hector.

Manasvi, D. M.
Meston, the Rt. Hon. Lord, of Agra and Dunottar, K.C.S.I., LL.D.
Morgan, Arthur Daniel, B.Sc.(Econ.).
Mynors, Humphrey C. B.
Newbery, Archibald David.
Ogilvie, Frederick Wolff.
Peach, Francis.
Rifaat, Mohammed Ali.
Robbins, Prof. Lionel.
Sachs, Alexander.
Sapru, Hirday Nath, B.A.
Schwartz, George Leopold.
Sheldrake, Bevis Swinborne.
Shewhart, W. A., Ph.D.
Shott, Arthur Reginald.
Simhan, K. L.
Smith, Katie Charlotte, B.A.
Sorensen, Soren.
Sturzenegger, Ernest.
Symons, Ronald Stuart.
Symons, Stanford Hansel Howard.
Wachenfelt, Miles de.
Walder, Ernest Derrick Lees, B.A., A.M.I.E.E.
Warner, Harry.
Whitehead, James, K.C., J.P.
Wyatt, Thomas William.

Representatives of Corporate Bodies :—

Eastham, Jack Kenneth,	*representing* the School of Economics and Commerce, Dundee.
Endean-Rowe, Sydney John,	*representing* The Hull and East Riding Economic League.
Hedges, H. E.	*representing* The Great Western Railway.
McCarthy, Patrick	*representing* The Papermakers' Association of Great Britain and Ireland, 1912 (Inc.).
Porter, J. F. A.	*representing* Saward, Baker & Co., Ltd.

During the Session 1931–32, 53 new Fellows were elected (one in place of a corporate representative who resigned), and the total number of Ordinary Fellows is now 1,020.

Statements showing the Society's receipts and expenditure during 1931 and the financial situation at the end of that year are given, as usual, in appendices. The position is not unsatisfactory, considering the general economic depression and the number of resignations which have taken place in consequence. In 1931 the excess of receipts over expenditure amounted, if life compositions are excluded, to £214. Receipts from sales of publications, both gross and net amounts, were less than in 1930. The demand for the *Journal* continues to be satisfactory, and many copies are sent to Government Departments and scientific institutions in the United Kingdom and abroad in exchange for their publications. The number of *Journal* subscriptions, many from abroad, shows an increase.

The Ordinary Meetings have been held in each month of the Session, and the papers read before the Society were as follows :—

1931.

I.—November 17 ... Glenday, R. G., M.C., M.A. Business Forecasting: a Quantitative Investigation of the Influence of Money on Trade Development.

II.—December 15 ... Discussion on the Balance of Trade. Opened by E. C. Snow, M.A., D.Sc.

1932.	
III.—January 19	Discussion on the Paper presented by the Industrial Institute on the Mathematical Statistical Analysis of Economic Data.
IV.—February 16	Discussion on Official Statistical Publications. Opened by Prof. M. Greenwood, F.R.S.
V.—March 15	Burnett-Hurst, A. R., M.Sc. Lancashire and the Indian Market.
VI.—April 19	White, G. Ronald, B.A. Livestock By-Products and By-Product Industries.
VII.—May 24	Macrosty, Henry W., O.B.E. Overseas Trade of the United Kingdom, 1924–31.
VIII.—June 21	Stamp, Sir J. C., G.B.E., LL.D., D.Sc. Course of Industrial Profits in the Past Twenty Years. (Presidential Address.)

The Study Group, under the chairmanship of Mr. A. P. L. Gordon, has held nine meetings during the session, and the subjects and openers of the discussions were as follows:—

Oct. 13	The Function of Statistics in Relation to Investment.—The Chairman.
Nov. 10	Wholesale Prices in the United Kingdom: the Board of Trade Index in Retrospect.—P. W. Stephen.
Dec. 1	The Recent Census.—W. S. Hocking, M.B.E.
Jan. 12	Measurement of Ability in Children.—B. C. Wallis.
Feb. 9	Elasticity of Demand for Coal.—A. Neuman.
Mar. 8	Value of Craniometry in Measuring Intelligence.—Brenda N. Stoessiger.
Apr. 12	Some Aspects of the Measurement of the Wastage of Fixed Capital.—W. A. Stewart-Jones.
May 10	The Decline in Agricultural Labour, 1924–30.—R. F. George.
June 14	Two New Price Indices.—Colin G. Clark.

The Watch Committee of the Study Group continued its work during the session under Dr. Irwin's chairmanship, and its reports are available to members of the Group at the Society's premises. The contributions include "Agricultural Statistics" by Dr. Wishart, "Recent Advances in Mathematical Statistics" by Dr. Irwin, and "Actuarial Literature" by Mr. White.

For the Session 1932–33, Miss Iris Douglas has been elected Chairman and Mr. R. F. George remains Secretary of the Group.

The Council are offering the Frances Wood Memorial Prize for competition in 1932. An announcement appeared in the *Journal*, Part I, p. 156.

As announced in Part II of the *Journal*, Mr. A. W. Flux, C.B., retired in May from the post of Assistant Secretary, Statistical

Department of the Board of Trade, after twenty-four years of work. Although it is understood that he will not for the future reside permanently in this country, it is hoped that he may continue to take an active part in the work of the Society, to which he has rendered continuous and invaluable service in the past; apart from his many contributions to the Proceedings and to the *Journal*, he has been closely identified with the Society's work as Honorary Secretary and as President, and his assistance at the Council meetings will be greatly missed.

The retirement of Mr. G. Udny Yule from his lectureship at Cambridge was announced in last year's Report. Shortly afterwards, he made a gift to the Society of over 300 bound volumes of early statistical and economic works, including a number on population problems and pauperism and some early census returns. This is by no means the first occasion on which the Society has been deeply indebted to Mr. Yule for presentations to its Library. The Annual Report for 1907 records that he presented a valuable collection of books on the theory of statistics, and since then he has several times made gifts of rare books, notably two editions of Graunt's *Bills of Mortality*, and two works by Süssmilch, and has in addition sent the Society examples of all his own work in the statistical field.

Fellows will already have received the circular regarding arrangements for celebrating the centenary of the Society, which will occur in 1934. Reference was also made to this matter at the May meeting by the President, who gave expression to the Council's hope that they might invite the International Statistical Institute to hold its biennial Meeting in London at the same time and in association with the Society's centenary. For various reasons it is felt to be both appropriate and desirable that the Institute should meet the Society on that occasion. Cordial relations have always been maintained between the two bodies, and in the membership of the Institute the Society is well represented. Although the Institute was inaugurated in London, no meeting has been held here since 1905, when the Society, with the help of special contributions from the Fellows and some other sources, was enabled to invite it. It is hoped that, notwithstanding the present difficulties, an adequate response may again be forthcoming from those who constitute the Royal Statistical Society.

In the year ended May 31, 1932, 1,387 works were added to the Library, compared with 1,335 in the previous year. These figures exclude Mr. G. Udny Yule's gift of over 300 volumes, also periodicals regularly received and a number of minor Parliamentary Papers.

During the same period 2,162 volumes were borrowed by 731 Fellows, against 1,609 by 749 Fellows the year before.

The Fellows named below (nominated in accordance with Bye-law 14) are recommended for election as President, Council and Officers of the Society for the Session 1932-33 :—

President.

*The Right Hon. the Lord Meston of Agra and Dunottar, K.C.S.I., LL.D.

Council.

*Percy Ashley, C.B., M.A.
W. A. Basham, O.B.E.
Sir W. H. Beveridge, K.C.B.
M. S. Birkett, O.B.E.
Sir Basil Blackett, K.C.B., K.C.S.I.
A. R. Burnett-Hurst.
Henry Clay.
Clara E. Collet.
Lewis R. Connor.
W. Palin Elderton, C.B.E., F.I.A.
Dorothy P. Etlinger.
Professor Major Greenwood, F.R.S.
A. P. L. Gordon.
Sir W. H. Hamer, M.D., F.R.C.P.
*R. G. Hawtrey.
*David Heron, M.A., D.Sc.
A. Bradford Hill, D.Sc.
Robert Holland-Martin, C.B.
*Leon Isserlis, D.Sc.
*H. Stanley Jevons, M.A., B.Sc.
Professor J. H. Jones.
A. W. Waterlow King.
H. W. Macrosty, O.B.E.
E. C. Rhodes, D.Sc.
E. C. Snow, D.Sc.
J. Calvert Spensley, O.B.E.
J. W. Verdier, O.B.E.
Harold Vigor.
S. P. Vivian, C.B.
John Wishart, D.Sc.

Those marked * are proposed as new Members of Council.

Honorary Treasurer.

Robert Holland-Martin, C.B.

Honorary Secretaries.

M. Greenwood, F.R.S.
H. W. Macrosty, O.B.E.
E. C. Snow, D.Sc.

Honorary Foreign Secretary.

M. Greenwood, F.R.S.

The abstract of the Treasurer's account of receipts and payments and the balance sheet as on December 31, 1931, together with the report of the Auditors on the accounts for the year 1931, are appended.

Signed on behalf of the Council,
J. C. STAMP,
President.

M. GREENWOOD,
H. W. MACROSTY, } *Hon. Secretaries.*
E. C. SNOW.

APPENDICES

APPEN

A.—(i) RECEIPTS AND PAYMENTS ACCOUNT FOR

RECEIPTS.

Year 1930.				Year 1931.		
£	*s.*	*d.*		£	*s.*	*d.*
			Annual subscriptions:—			
1,497	*6*	*0*	For current year (720)	1,512	0	0
111	*6*	*0*	Arrears (49)	102	18	0
54	*12*	*0*	In advance (25)	52	10	0
1,663	*4*	*0*		1,667	8	0
451	*2*	*9*	Dividends and interest (including income tax refunded)	451	11	9
1,026	*0*	*3*	Journal sales (including reprints)	947	12	3
7	*10*	*0*	Journal advertisements	8	5	0
5	*5*	*4*	Sales of other publications	4	14	6
60	*10*	*6*	Use of rooms	60	0	0
5	*10*	*0*	Study Group subscriptions	3	10	0
1	*6*	*0*	Miscellaneous	3	10	4
3,220	*8*	*10*	Total of Ordinary Receipts	3,146	11	10
600	*0*	*0*	Sale of set of "The Times"	—		
126	*0*	*0*	Life compositions	115	10	0
£3,946	*8*	*10*		£3,262	1	10

DICES

THE YEAR ENDED 31ST DECEMBER, 1931.

PAYMENTS.

Year 1930. £	*s.*	*d.*		Year 1931. £	*s.*	*d.*
			Journal:—			
643	*9*	*0*	Printing and paper	693	13	11
45	*3*	*0*	Reviewing	55	2	6
22	*0*	*6*	Reporting	23	14	0
96	*16*	*11*	Distribution	87	1	5
33	*11*	*6*	Re-purchase of scarce parts ...	43	16	4
841	*0*	*11*		903		
151	*4*	*4*	Meetings (including printing and postage)	146	10	8
58	*1*	*4*	Library books	74	14	11
62	*3*	*6*	Library binding...	131	7	1
863	*18*	*2*	Salaries and wages	921	9	8
380	*0*	*0*	Rent	380	0	0
2	*15*	*5*	Land tax	2	15	5
14	*8*	*10*	Insurance	14	4	10
84	*2*	*5*	Fuel, light and water	84	12	1
40	*10*	*6*	House expenses	51	3	3
27	*0*	*6*	Repairs to premises	19	7	3
27	*14*	*0*	Furniture and equipment	7	17	8
59	*9*	*7*	Postage, carriage and telephone ...	61	16	4
117	*13*	*8*	Stationery and miscellaneous printing	106	9	7
—			Study Group	9	8	0
25	*5*	*0*	Guy Medals	—		
—			Agreement for premises (legal fees and stamp)...	12	17	0
8	*2*	*9*	Miscellaneous	4	17	5
2,763	*10*	*11*	Total of Ordinary Payments	2,932	19	4
699	*11*	*0*	Investments purchased (£875 3½% Conversion Loan)			
3,463	*1*	*11*		2,932	19	4
483	*6*	*11*	Excess of Receipts over Payments ...	329	2	6
£3,946	*8*	*10*		£3,262	1	10

APPEN

A.—(ii) BALANCE SHEET

LIABILITIES.

Year 1930.				Year 1931.		
£	*s.*	*d.*		£	*s.*	*d.*
54	*12*	*0*	Advance annual subscriptions ...	52	10	0
104	*9*	*0*	Advance Journal subscriptions ...	69	4	0
202	*4*	*6*	Sundry creditors	247	18	6
361	*5*	*6*		369	12	6
1,417	*10*	*0*	Life composition fund	1,514	2	0
8,331	*17*	*7*	Balance in favour of the Society (exclusive of (1) Books in Library, (2) Journals and other publications in stock, and (3) Pictures, Furniture and Fixtures)...	8,609	16	5
£10,110	*13*	*1*		£10,493	10	11

BUILDING FUND (ESTAB

On 31st December, 1930, the Fund consisted of £641 3*s.* 1*d.* 3½ per cent. Con
1931 (£35 12*s.* 1*d.*) were invested in £23 2*s.* 10*d.* 3½ per cent. Conversion
£664 5*s.* 11*d.* 3½ per cent. Conversion Loan, and £597 13*s.* 9*d.* 4 per cent.
being £979. Income tax has been reclaimed and will be available for

FRANCES WOOD MEMORIAL FUND

On 31st December, 1930, the Fund consisted of £500 4 per cent. Preference
During 1931, dividends of £15 10*s.* were received. No payments were
£500 4 per cent. Preference Stock, London, Midland & Scottish Railway
Income tax has been reclaimed and will be credited to the Fund in 1932.

REPORT OF

"We have examined the foregoing Receipts and Payments Account, Balance
Memorial Fund with the Books and Vouchers of the Society and find them
opinion, properly drawn up so as to exhibit a true and correct view of the
Investments and Cash Balances."

DICES

AT 31ST DECEMBER 1931.

ASSETS.

Year 1930. £	*s.*	*d.*		£	*s.*	*d.*	Year 1931. £	*s.*	*d.*
			Investments at cost or under:—						
1,185	*0*	*0*	£2,236 11*s.* 3*d.* 2½% Consols (General Fund)				1,185	0	0
5,580	*0*	*0*	£10,527 12*s.* 3*d.* 2½% Consols (Guy Bequest)				5,580	0	0
1,299	*0*	*0*	£1,841 3½% Conversion Loan ...				1,299	0	0
504	*0*	*0*	£500 5% War Loan 1929–47 ...				504	0	0
386	*0*	*0*	£666 4% 2nd Pref. Stock, L. & N.E. Rly.				386	0	0
101	*0*	*0*	£266 5% Prefd. Ord. Stock, L. & N.E. Rly.				101	0	0
9,055	*0*	*0*	(Market value, £9,151)				9,055	0	0
			Cash:—	£	*s.*	*d.*			
			On deposit	1100	0	0			
			On current account ...	203	9	9			
			In hand	7	15	6			
917	*18*	*11*					1,311	5	3
84	*0*	*0*	Arrears of annual subscriptions recoverable (say 40)				84	0	0
23	*14*	*2*	Sundry debtors				43	5	8
£10,110	*13*	*1*					£10,493	10	11

LISHED 10TH JULY, 1873).

version Loan, and £577 18*s.* 3*d.* 4 per cent. Consols. The dividends received during
Loan, and £19 5*s.* 6*d.* 4 per cent. Consols, and the Fund now consists of
Consols, the total value at 31st December, 1931 (at 73¼ and 81¼ respectively)
investment in 1932.

(ESTABLISHED 13TH MAY, 1920).

Stock, London, Midland & Scottish Railway, and £77 13*s.* 6*d.* cash in hand.
made out of the Fund in 1931, and at December 31, 1931, the Fund consisted of
(value at 31st December 1931, at 46½, £232), and £93 3*s.* 6*d.* cash in hand.

THE AUDITORS.

Sheet and Statements in regard to the Building Fund and the Frances Wood
to be in accordance therewith. We report that the Balance Sheet is, in our
state of the Society's affairs, as shown by the Books. We have verified the

(SIGNED) P. G. BROWN.
H. S. JEVONS.
J. W. VERDIER.

APPEN

B.—STATEMENT OF THE CONDITION OF THE SOCIETY

Year.	Constitution.				Fin					
	Number of Fellows at end of Year.		Changes during the Year.		Receipts.					
	Totals.	Life Fellows included therein.	Gains by Election, &c.	Losses by Death, &c.	Annual Subscriptions.	Compositions.[1]	Dividends, Interest, &c.[2]	Journal Sales.	Other Items.	Totals.
					£	£	£	£	£	£
1907	861	172	33	63	1,363	82	349	327	58	2,179
1908	855	170	40	46	1,339	84	351	254	143	2,171
1909	825	167	52	82	1,307	84	354	273	42	2,060
1910	845	172	57	37	1,304	141	420	326	54	2,245
1911	867	174	62	40	1,415	126	341	308	65	2,255
1912	854	175	44	57	1,336	105	341	334	41	2,157
1913	846	174	53	61	1,331	84	341	294	58	2,108
1914	821	169	39	64	1,281	42	339	271	51	1,984
1915	772	163	12	61	1,243	63	319	268	32	1,925
1916	758	163	34	48	1,181	42	284	325	18	1,850
1917	757	161	40	41	1,186	53	276	311	130	1,956
1918	761	167	47	43	1,132	222	456	305	3	2,119
1919	796	172	91	56	1,297	273	276	603	10	2,459
1920	882	180	123	37	1,373	251	291	730	95	2,740
1921	946	186	112	48	1,481	231	603	662	39	3,015
1922	969	187	71	48	1,499	126	454	689	142	2,910
1923	996	195	66	39	1,476	242	506	739	114	3,075
1924	1,002	194	68	62	1,638	105	400	666	81	2,890
1925	1,030	195	79	51	1,611	189	399	807	43	3,049
1926	1,054	197	77	53	1,619	116	404	780	112	3,031
1927	1,074	199	62	42	1,665	84	376	792	84	3,001
1928	1,079	201	56	51	1,680	84	397	748	87	2,996
1929	1,076	202	61	64	1,804	137	400	866	124	3,331
1930	1,058	204	50	68	1,663	126	451	1,026	680[6]	3,946
1931	1,064	208	62	56	1,667	115	452	948	80	3,262

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[1] Carried to Life Composition Fund from 1921 onwards.

[2] Including income tax refunded.

[3] Exclusive of the Building and Frances Wood Memorial Funds.

DICES

DURING THE LAST TWENTY-FIVE YEARS, 1907-1931.

ance.

Payments.							Market Values of Investments at end of Year.[3]	Year.
Journal.	Meetings.	Library, Books and Binding.	Salaries and Wages.	Rent.	Other Items.	Totals.		
£	£	£	£	£	£	£	£	
571	69	87	530	380	176	1,813	11,746	1907
535	72	93	602	380	458	2,140	11,920	1908
636	74	99	550	380	315	2,054	12,085	1909
808	90	74	582	380	727[4]	2,661	11,210	1910
621	89	104	602	380	576	2,372	10,874	1911
725	85	81	620	380	283	2,174	10,599	1912
658	76	79	632	380	233	2,058	10,092	1913
793	82	88	615	380	361	2,319	9,528	1914
458	64	40	480	380	222	1,644	8,182	1915
516	50	36	492	380	181	1,655	7,702	1916
413	71	54	516	380	199	1,633	7,656	1917
651	91	33	534	380	211	1,900	8,282	1918
774	86	50	645	380	349	2,284	7,672	1919
913	89	99	904	380	454	2,839	6,848	1920
900	110	94	954	380	390	2,828	7,605	1921
983	98	103	1,006	380	755[5]	3,325	8,605	1922
922	146	107	1,010	380	445	2,940	8,666	1923
947	127	138	1,022	380	357	2,971	8,962	1924
940	132	116	1,021	380	373	2,962	8,423	1925
1,144	131	98	991	380	366	3,110	8,122	1926
1,213	150	119	899	380	302	3,063	8,375	1927
835	136	104	793	380	517	2,765	8,343	1928
839	150	156	878	380	238	2,741	8,462	1929
841	151	120	864	380	408	2,764	9,636	1930
903	147	206	921	380	376	2,933	9,151	1931

[4] Includes £436 for re-decoration, etc., in 1910.
[5] Includes £395 for Catalogue printing in 1922.
[6] Includes £600 from sale of *Times* in 1930.

PROCEEDINGS OF THE NINETY-EIGHTH ANNUAL GENERAL MEETING OF THE ROYAL STATISTICAL SOCIETY, HELD IN THE HALL OF THE ROYAL SOCIETY OF ARTS ON TUESDAY, JUNE 21ST, 1932.

The Chair was taken by the PRESIDENT, SIR JOSIAH STAMP, G.B.E., LL.D., D.Sc., F.B.A., at 5 p.m.

The HONORARY SECRETARY read the circular convening the meeting.

The Report of the Council for the financial year 1931 and the Session 1931–32 was presented to the meeting and taken as read. The CHAIRMAN moved the adoption of the Report; the motion was seconded by Mr. Dent, put to the meeting, and unanimously adopted.

The HONORARY SECRETARY announced that the names of the following would be removed from the roll of the Society in accordance with Bye-law No. 9, their Annual Subscriptions being more than two years in arrear:

S. E. R. Beattie, Robert Carson, F. E. H. Carter, F. T. Castells, Yi Chen, H. E. Coates, R. J. Coles, W. Pollard Digby, W. B. Faraday, G. S. Hawthorne, A. Bertram Hill, Kuo Pao King, R. E. B. Lee, George Porter, N. H. Prouty, R. W. Quinton, T. Smith Sanders, Leslie Storey.

The CHAIRMAN then referred to the paragraph in the Report which concerned the proposed invitation to the International Statistical Institute to hold its twenty-second Session in London. The position was that the Society would be celebrating its Centenary in the spring of 1934, and it was hoped to make that an occasion worthy of the record of the Society. At the same time there was the opportunity —as the International Statistical Institute had not had a meeting in London for many years—of combining a meeting of that Institute with the Centenary of the Society and of thus making a still more important occasion of it.

On the occasion of the Jubilee of the Royal Statistical Society a large number of foreign guests attended, and out of their deliberations sprang the International Statistical Institute. The year 1934 would nearly coincide with the Jubilee of the Institute, and it was therefore especially appropriate that the two events should be connected.

This invitation, however, could not be given until the Society could be assured of a reasonable amount of financial backing, and it was in order to test what kind of financial backing could be expected that the circular had been sent out. The response so far had been encouraging, but the full sentiment of the Fellows towards the proposal was not yet known, and the Society would be glad if it could have some definite indication from each Fellow that he could, or could not, support the appeal for funds to carry out the proposed plan in a manner worthy of the occasion.

It was announced that as a result of the ballot taken during the meeting the candidates named below had been elected Fellows of the Society:

The Right Hon. Lord Meston of Agra and Dunottar, K.C.S.I., LL.D.,

Frederick Wolff Ogilvie, Professor of Economics, Edinburgh University.

The ballot for the election of the Council and Officers for the ensuing Session was then taken, Miss Douglas and Mr. R. F. George being appointed as scrutineers.

Professor Turin proposed a vote of thanks to the President and Council of the Society.

Mr. Gampell seconded the proposal, which was carried unanimously.

The CHAIRMAN, replying on behalf of the retiring Council and the Officers of the Society, expressed their appreciation of the vote of thanks accorded and said that the labour had been a labour of love. He then announced that the Council and Officers named on the ballot paper had all been elected.

The meeting then adjourned for the Ordinary Meeting.

REVIEWS OF STATISTICAL AND ECONOMIC BOOKS.

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1.—*Contributions to the History of Statistics.* By Harald Westergaard. London: P. S. King and Son, 1932. 8¾″ + 5½″. vii + 280 pp. *12s. 6d.*

Although it may not be essential that the driver of fat oxen should himself be fat, it is certainly desirable that the historian of the numerous, loosely co-ordinated activities, which together make up what we call statistics, should have not only a general acquaintance with all of them, but also an expert and intimate knowledge of some. There can be few men living who fulfil these requirements so admirably as Professor Harald Westergaard, a teacher of great experience and a statistical research worker whose contributions to methodology do honour to a country which has produced so many eminent statisticians. Further, English readers will appreciate the compliment Dr. Westergaard has paid them in writing his book in English, and will assure him that his fear that the book "can hardly expect much attention" is quite groundless.

The heterogeneity of the subject-matter imposes on any historian who plans a book rather than an encyclopædia the necessity of selection. Dr. Westergaard has limited himself in time to the period beginning in the sixteenth and ending with the nineteenth century, and in his choice of subjects he has given special attention to what can roughly be called vital statistics. In the first two chapters we have an introductory sketch of the position before the publication of John Graunt's classical work. The third chapter deals with the pioneers of the late seventeenth century, particularly John Graunt and Edmund Halley. The next three chapters bring the history of vital statistical studies down to the middle of the eighteenth century. The seventh chapter is devoted to Süssmilch and his contemporaries. In the eighth chapter we have an account of methods of estimating and enumerating populations used in the eighteenth century. The ninth and tenth chapters are concerned with theoretical investigations and, although well worth reading, are perhaps of less interest to the English student who knows, or should know, his " Todhunter," than the rest of the book. Chapter XI is a valuable sketch of the organization of official statistics at the beginning of the nineteenth century. Chapter XII opens with a criticism of Malthus, and then deals with some of the earlier actuarial work of the nineteenth century. The author is, we think, not quite correct in attributing to Robert Watt of Glasgow the opinion that " vaccination aggravated or even caused other diseases." Watt's suggestion was that as one disease declined or was eliminated another took its place, was substituted for it. Since his conclusion was based not upon true rates of mortality but upon what were, virtually, proportional mortalities, it was hardly justifiable. The thirteenth chapter, which is entitled " The Era of Enthusiasm," is an excellent critical study of the exaggerated expectations entertained eighty to a hundred years ago of what could be discovered by the statistical method applied diligently, but, as we should all now think, uncritically. Dr. Westergaard deals rather severely, but not, we must confess, without good reason, with the writings of various physicians, including our enthusiastic officer and benefactor William Augustus Guy. Chapter XIV is concerned with Statistical Congresses, the weaknesses of which, as well as the good points, are brought out. Newmarch's characterization of these as " international picnics " *may* have crossed the minds of more recent visitors to congresses. Chapter XV deals with the progress of economic statistics in the congress period, practically from the middle of the nineteenth century to its last decade but one. Chapter XVI deals in a similar way, but in more detail, with the practice and theory of vital statistics through the same epoch. The concluding chapter carries the story down to the end of the nineteenth century. Here again, prominence is given to the statistical investigation of mortality and the calculus of correlation is dealt with briefly and rather coldly.

Anybody who reads this book cannot fail to derive from it much profit, and to some it should give needed encouragement. Eighty years ago, in what we may call the first " Era of Enthusiasm," much harm was done by patent neglect of mathematical logic; statistics as a scientific method suffered, in the opinion of level-headed men, and continued to suffer for at least two generations, from those mistakes. We are now living in a second " Era of Enthusiasm," and there is a risk of another set-back. It is a truism that ability to use the exquisite logical instruments of mathematical analysis presupposes a long education which few, and a natural ability which still fewer people have; if those lacking these advantages, but blessed with that inquisitiveness which is the hallmark of a research worker, dazed by the output of algebra which is termed statistical, conclude that either they must be the passive instruments of mathematicians or must learn a new and very difficult language before they can do any serious statistical work, the outlook is gloomy. Dr. Westergaard's book should encourage such readers, not to be scornful of mathematical theory—and so to make again the old mistake—but to think that there are still many opportunities to discover important truth not bolted and barred against those to whom Combinatory Analysis is a sealed book and Determinants are fearful wild-fowl. M. G.

2.—*Versicherungswesen: System der Versicherungswirtschaft.* Von Alfred Manes. Vol. II, Güterversicherung. 1931. xii + 316 pp. *Rm.* 18 bound. Vol. III, Personenversicherung. 1932. ix + 356 pp. *Rm.* 22 bound. Leipzig und Berlin: B. G. Teubner. 9″ × 6″.

Grundzüge des Versicherungswesens. Von Alfred Manes. Fifth Edition. Leipzig und Berlin: B. G. Teubner. 1932. 8″ × 5″. iv + 204 pp. *Rm.* 5 bound.

The two volumes of the *Versicherungswesen* complete Professor Manes' comprehensive treatise on insurance as a branch of economics. In the first volume, reviewed in the *Journal*, Vol. XCIV, p. 304, all kinds of insurance were considered together as a concrete whole, so far as feasible. Both of the latter, on the other hand, treat of each class separately, Volume II being restricted to all those forms of insurance involving material wealth or rights, while Volume III concerns itself with insurance relative to human life and health.

Volume II is divided into two main parts, the first applicable to the insurance of things and the second to the insurance of rights. These terms are not yet customary, but Professor Manes is a jurist, and has applied his legal talents towards endeavours to systematize nomenclature, which is rather haphazard in the various languages. As examples of the things, we have transport insurance in its many forms, usually transacted under the heading of its principal branch, marine, in this country; fire; hail, which has developed into an important business in Germany; cattle; burglary and other aspects of wrongdoing in connection with valuables, which are termed collectively "delict" insurance; water damage; plate glass, and many more. Of the newer groups, mention may be made of what is called "property life insurance," which not only maintains the insured object in repair, but also replaces it when necessary, and at latest at the end of a prescribed term of years—the methods of life assurance being employed for material things. Originally conceived for ships, it is being developed for buildings.

The Part relative to the insurance of rights covers the important branch of employers' liability and workmen's compensation, including likewise credit insurance and loss of profits insurance.

The cultivation of reinsurance as a separate and important branch, apart from being merely a casual means of dividing up large risks, owes so much to German industry that the chapter devoted to it deserves particular note.

The life volume equally consists of two parts or, more strictly, of two volumes bound together, for there is a far-reaching differentiation between insurance as conducted by the ordinary life office—the subject of the first part—and what is known as public health or social insurance—dealt with in the second. The sections of the subject are life, sickness, invalidity, and accident insurance, while under social insurance there is included a chapter on unemployment insurance. Each section or chapter describes the historical development and present position of the subject, giving the latest available statistics, passing on to technical aspects, and describing the varied forms of insurance that have been or are being cultivated in different countries.

To the student of economics and currency there is a vivid interest in the portrayal of what took place during the period of inflation: the inconvenience of dealing with an unstable currency, in meeting the requirements of the insuring public; the hindrances to contracts in foreign coinage, and the losses under this head due to existing arrangements, especially to offices operating in other countries; the extreme misfortunes ensuing on an exchange that fell so much that soon the premium collections were inadequate to pay the salaries of a rapidly reduced staff, and finally where even the sums insured payable as claims were not worth collecting. It is understood that by the end of the inflation period the offices had lost on the average about 85 per cent. of their assets, with wide individual deviations. The statistical summaries show how rapidly the position has been improved since then, demonstrating that there has been no lack of public confidence in insurance institutions.

In these three notable volumes Professor Manes completes a worthy task—namely, that of laying down a general theory of insurance on the lines of economics, running parallel with that which has been developed elsewhere and so widely for banking and currency. He has ranged the civilized world, and yet, apart from a few unevennesses, has attained to a remarkable symmetry in the disposition of his work.

Those desirous of considering the economic aspects of insurance on the unique lines developed by Professor Manes in his *Versicherungswesen* with less labour than is necessitated by the 1100 odd pages of the latter may be recommended to the condensation entitled *Grundzüge des Versicherungswesens*, as affording a concise view of the elements of the subject. It deals firstly with insurance in general under the aspects of its definition, nature and significance; its development, organization and management; and its political and scientific standpoint. Then attention is directed to each separate branch of insurance, classified according to whether the insurance covers material possessions or involves the bodily welfare of persons. The former is subdivided into the insurance of things—marine, fire, etc.—and of rights, such as workmen's compensation and employers' liability, while the latter is also subdivided into ordinary insurance and national health insurance respectively, each including life, sickness, invalidity and accident insurance.

This small book may, in fact, be regarded as a complete summary or revise of the more important work, relieved of much historical and other matter. G. W. R.

3.—*Measures of Exports of the United States.* By Dudley J. Cowden, Ph.D., University Fellow in Economics. New York: Columbia University Press. 1931. (London: P. S. King.) 8¾″ × 5¾″. 123 pp. 8*s*.

The avowed purpose of Dr. Cowden's book is to provide a means of comparing price and volume movements of domestic exports from the United States with cyclical fluctuations in American business. As cited in one of the appendices, a number of attempts have been made to measure the volume of exports from the United States, and in particular the method of construction of the Department of Commerce indices of quantity and price changes of imports and exports is described. This, it may be recalled, uses the Irving Fisher "ideal formula," which satisfies the time reversal test, and is based (for exports) on some 200 commodities recorded by quantities, the remaining goods, which are largely recorded by value, being dealt with by assuming that their prices have moved parallel with the prices of the commodities directly covered, omitting, however, from these any particular articles (of large magnitude) which in a given year depart widely from the prevailing price tendency.

The author in his calculations has used a sample of varying sizes, increasing from 212 commodities in 1923 to 255 in 1930, and has made no estimate in respect of the trade in the remaining articles. By making adjustments, some of which will be referred to later, he arrives at figures for the years 1923 to 1930 which differ in some respects from those published by the Department of Commerce. There is an increasing difference in the volume indices—that of the Department of Commerce being for 1929 some 4 per cent. and for 1930 about 6 per cent. above that of Dr. Cowden—and a difference in the opposite direction but of smaller magnitude for the price indices. These differences he explains as being due, firstly, to the Department of Commerce index being inadequately weighted with finished manufactures, and secondly, to the value of his sample declining relative to the value of all commodities by rather more than 2 per cent.

The selection of the sample is discussed at some length, and Dr. Cowden explains that he has endeavoured to secure adequate representation of each of the main groups in which United States exports are classified, and with this end in view he has used multipliers, in some cases varying owing to changes in the sample, ranging from ⅓ to 3. The commodities used in the sample differ to some extent from year to year, and after applying the multipliers the value of the sample represents about 65 per cent. of the total value of the exports, there being, however, a much smaller representation of finished manufactures (36 per cent.) than of the other four classes of United States exports, viz. raw materials, raw foodstuffs, manufactured foodstuffs, and semi-manufactures. The choice of data is limited both by lack of quantity figures and by lack of homogeneity.

The greater part of the book is devoted to the possible methods of constructing index numbers of prices and volume of exports, and to a summary of the work of other American writers—Irving Fisher, Warren M. Persons and Willford I. King—on the subject of index numbers in general. It is pointed out that if commodities whose prices rise more (or fall less) than the average are also commodities whose quantities rise more (or fall less) than the average, and/or if commodities whose prices fall more (or rise less) than the average are also commodities whose quantities fall more (or rise less) than the average, an index number with given year weights will tend to deviate upward from an index with base year weights; and if this situation persists for several periods, a chain index with either system of weighting may deviate upward from a fixed base index with base year weights. And vice versa. By averaging geometrically the indices based on given year and preceding year weights, as in the "ideal formula," this "weight correlation bias" is not got rid of. In order that an index may reflect both long-time and short-term changes, it should satisfy the "circular" test, viz. $P12 \times P23 \times \ldots \times Pn1 = 1$, where $P12$ refers to the price index number of period 2 relative to period 1. This test cannot be satisfied by any index number with "weight correlation bias." In addition, index numbers representing price and volume changes should meet the "factor reversal" test, which requires that the product of a price index and a volume index should be an accurate measure of value change. The author concludes that since it is impossible to find a formula which satisfies perfectly all purposes, it is necessary either to construct separate indices for each purpose, or else to decide what method will most nearly satisfy the objects for which it is intended, but satisfy best the objects of primary importance.

The actual price and volume indices used by Dr. Cowden are modifications of the ideal formula. The variation from the usual procedure consists in chaining back to the original base each of the index numbers, with given year weights and preceding year weights respectively, before averaging them geometrically. He claims that these satisfy not only the factor reversal test, but that the indices have practically no weight correlation bias, since the price index also satisfies approximately the circular test, basing the latter claim on a calculation made for the year 1928 as related to the base period 1923–25. While the results for the five separate classes differ to some extent from unity, that for the sample as a whole differs from unity by only 0·04 per cent., but, in view of the changing sample, the test is of doubtful validity.

For compiling monthly index numbers a different method has been used, with a view to saving labour. The volume formula employs preceding year price weights and the price formula given year quantity weights. These, if multiplied together, indicate accurately the value changes of the samples, but have considerable weight correlation bias, which has been measured by comparison with the annual index. The deviation, over the period 1923 to 1930, proved to be fairly constant in trend, that for total exports being one-third of 1 per cent. per month. It is stated that the regularity of the increase in the deviations suggests that they are due to persisting economic factors. For some reason not explained, the product of the monthly volume and price indices for the sample approximates more closely to the changes in the monthly value of all domestic exports than does the product of the annual price index.

In a final chapter the author summarizes the results obtained, some of which have been referred to above. There is considerable difference, as might be expected, between the indices resulting from given year and base year weighting of each class of exports. It is shown that there has been an upward tendency in the base year index relative to the other, and that, generally speaking, boom years in American business are years when the divergence of preceding year weighting is upward, but in years of depression this system of weighting deflects the index downward. Charts covering the period 1923 to 1930 are given showing for United States exports, by classes, (1) annual price, volume, and value indices, (2) monthly price indices, (3) seasonal variations in volume, and (4) monthly volume indices with seasonal variations eliminated. The volume indices show considerable fluctuations month by month even after they have been smoothed by the method used by Dr. Cowden, and it is open to question whether any monthly index of imports or exports can be regarded as satisfactory. Had the period dealt with been the quarter instead of the month, the charts would have been clearer and would have shown the trend better. The results deduced from this series of charts as to the relation between price and volume movements of United States exports and cyclical fluctuations in American business are of somewhat local interest, but as a summary of the work of well-known American authors on index numbers the book has a wider interest, while the new price and volume formulae evolved may, perchance, prove of some utility. They are, at any rate, interesting as an attempt to show long period and short period trends by means of a single formula. H. L.

4.—*Statistics of Migration. Definitions—Methods—Classifications.* Studies and Reports, Series N (Statistics) No. 18. Geneva: International Labour Office; London: P. S. King. 1932. 9¼″ × 6¼″. 152 pp. 3*s*. 6*d*.

The possibility of obtaining comparable international migration statistics has been considered at frequent intervals since the meeting of the International Emigration Commission in 1921. Recommendations were made, or resolutions passed, at the International Labour Conference at Geneva in 1922 and at the International Conference on Emigration and Immigration held at Rome in 1924; and also at the sessions of the International Statistical Institute at Warsaw in 1929 and at Madrid in 1931. In view of the discussions of the Conference, the International Labour Office in January, 1930, communicated to the competent national authorities a statistical study entitled "Migration Movements, 1925–1927," in which the figures, collected and grouped in tables, were accompanied by an explanation of the principles on which the national statistics had been co-ordinated in an international scheme. The present report is stated to be a methodological study of the principal questions which form the subject of migration statistics, considered in the light of the practice followed in the various countries and with a view to the requirements of international comparability. It is divided into three chapters.

Chapter I deals with the definition of a migrant, and examines the various bases used for determining this classification. The definition of a migrant may depend on legislation or on (1) Conditions of Transport, as was the case for persons leaving the United Kingdom up to the middle of the nineteenth century, (2) Personal Factors, *e.g.* whether persons are manual workers, or belong to the coloured races, (3) Search for a Livelihood, or (4) Length of Stay, for which the determining period may vary very widely. Attempts are made to draft a uniform definition, and certain proposals are considered regarding the statistical definition of a migrant. The resolutions regarding statistics that the Conference think should be adopted are comprehensive of all forms of migration, permanent, temporary, and seasonal emigration and immigration and transmigration.

Chapter II is devoted to the method of compilation of migration statistics. A distinction is made between *simple* and *combined* methods. The first are based on a single specific movement of the migrant's journey, while the second represent a combination of several simple methods. The advantages and disadvantages of both methods are explained. Among the simple methods are the following: (*a*) methods applied at the place of last residence, viz. statistics of offices of information for migrants, statistics of passports, of visas, of communal registers, of declarations of residence, and of transport contracts; (*b*) methods applied on leaving the country of last residence or entering the country of future residence, viz. port statistics and returns at land frontiers; (*c*) supervision of aliens in the country of future residence. From the point of view of a national combined method (identity documents with detachable coupons) the example of Italy is regarded as a valuable experience. It is stated that at the Emigration and Immigration Conference at Rome in 1924, forty-six Governments pronounced in favour of the introduction of identity books for migrants: the United Kingdom was a notable omission from the list.

Chapter III: While the international comparability of statistics requires, as a primary condition, a certain degree of uniformity in definitions and methods of making returns, there must also be a sufficient similarity in the classification of the principal categories of migrants and the information relating to them. It is considered desirable for national and international statistics to distinguish eight migration movements, *i.e.* intercontinental and continental emigration and immigration of nationals and aliens. Information which the 1922 Conference recommended for compilation relates to the classification of migrants by sex, age, and occupation, and further information which has been subsequently considered concerns marital condition, individual and family migration, assisted migration, religion, and education.

It is understood that the report has been prepared as a basis for discussion at the meeting of International Migration Statisticians which it is proposed to hold in the autumn of 1932. T. P.

5.—*Papers on Gold and the Price Level.* By Sir Josiah Stamp, G.B.E. London: P. S. King. 1931. 8½″ × 5¼″. x + 127 pp. 7*s.* 6*d.*

This book is primarily a collection of articles and speeches dating between June, 1928, and March, 1931, but appended to it is a section of retrospect recording Sir Josiah Stamp's views on the subject of the price level on many occasions, from the War down to 1927. "It forms," he says, "a contemporary record, free from wisdom after the event, which shows the mind fumbling after the truth and straining into the future, and gives the novice some idea of what is involved in prophecy and estimate of the economic future by reference to first principles in the midst of conflicting and half-realized facts."

The retrospect not only adds weight and point to the book, but also contains more than one amusing passage in Sir Josiah Stamp's characteristic vein of humour. (There is, I think, an inaccuracy in regard to date on page 93. Mr. Churchill was not Chancellor of the Exchequer in February, 1924, and perhaps the article in the *Wall Street Journal* should be dated February, 1925.)

The following passage, spoken in January, 1925, may be selected for quotation:

"The gold standard will by no means end all the difficulties, for once having determined to link our fortunes to the value of gold, we shall have to follow it wherever it goes, and this may easily mean a much greater fluctuation in the price level than we have recently experienced. The recent fluctuations in gold have been greater than the fluctuations in sterling, and it does not follow that we are really changing to a less variable medium than we have enjoyed in the past, anxious as we are to eliminate the human element and to get back to what we regard as natural" (p. 99).

In August, 1930, when the trade depression was well under way, Sir J. Stamp, after referring to the various explanations put forward by economists, wrote: "I think I have taken my part from time to time in urging the issues of freedom of trade, of excessive social burdens, of rationalization, of 'balance' in the application of savings, but I have not failed during the past eight years to give pride of place, at first amongst our potential dangers, and later, amongst our effective handicaps, to the monetary factor" (p. 40).

The latest pronouncement in the book is dated March, 1931. And here Sir J. Stamp for the first time gives the reader the impression that he is weakening in his advocacy. He enumerates eighteen causes of the trade depression, which include most of those which pass current in contemporary controversy, and while he expresses the belief that the underlying causes are those relating to the monetary factors, because they exaggerate and exacerbate the others, he contends that monetary causes "may have been very important in bringing about the world depression, but we have gone so far now that they do very little immediately to get us out" (p. 59). If they can do "very little," what other refuge have we? Sir J. Stamp's answer at that time was a protective tariff. He had recommended it to the Macmillan Committee. "My desire was to produce the same effect upon prices as nearly as possible as a general rise in the price level, due to currency devices."

"The multiplication of tariffs" appears as one of the eighteen causes of the depression, but its injurious effect is limited to "the national antipathies and the artificial and unnatural methods of trading that it induces" (p. 59). The fatal fault of a protective tariff is that it does *not* have the same sort of effect on the price level as currency devices. It creates a new and special kind of disparity, a disparity between the price levels of importable goods and exportable goods. A country dependent on foreign trade feels the effect of foreign tariffs in a relatively intensified depression of its export industries. If it in turn adopts a tariff, the disparity is *increased.* So long as this country was on the gold standard, it might fairly be argued that a tariff would improve the position of those industries which were competing with imports, while it would do little or no positive harm to the export industries. And many free-traders were prepared to recommend it, subject to safeguards, such as Sir J. Stamp laid down, to ensure its being treated as no more than a temporary measure.

But obviously from the *world* point of view it was no remedy at all. Any country that gained by imposing a tariff gained only at the cost of intensifying the troubles of its neighbours. It is, I think, unfortunate that Sir J. Stamp should conclude so consistent, cogent and illuminating an exposition of the dangers of unstable money and of the methods of avoiding or remedying them, with this narrowing of his outlook. R. G. H.

6.—*The Silver Situation: Problems and Possibilities.* By T. E. Gregory. Manchester: University Press, 1932. 8½" × 5½". 48 pp. *1s. 6d.*

This pamphlet is composed of a memorandum prepared at the request of the Manchester Chamber of Commerce. It is not intended to go beyond an exposition of the subject, but in the author's opinion the facts which it sets out lead to the conclusions that the problem of the gold price of silver is primarily part of the more general problem of falling gold prices, and that any attempt to raise the gold price of silver independently of general price changes must give rise to serious misgiving when the consequences to China are taken into account.

The first half of the pamphlet is statistical. It sets out with admirable clearness and conciseness the movements of the price of silver in relation to the movements of the gold price level and the sterling price level, and the principal facts in regard to the supply of silver and the demand for it.

When he comes to proposed remedies, Professor Gregory points out the dilemma involved in bimetallism. Either the ratio will be close to the existing market ratio, and the effect on the world price level will be small; or the ratio chosen will be such as to imply a big rise in the gold price of silver, in which case bimetallism cannot be worked at all without a fairly comprehensive international participation, which is not to be hoped for.

I am not sure that he has stated the dilemma quite in the most pertinent form. Suppose the United States were considering the introduction of bimetallism single-handed. How much silver would the Federal Reserve System have to acquire? If silver were raised to 50 cents a fine ounce, the Indian redundant silver might amount at the most to $200 million. Professor Gregory does not consider how much might be released from China. But if the whole of the 650,000,000 ounces absorbed by China in the seven years 1924–30 were let loose, the amount to be absorbed by America would only displace a very modest fraction of the existing gold reserves. Such amount of free silver as could conceivably flow into the United States could undoubtedly be absorbed without difficulty.

It may be retorted that there is no prospect of the United States adopting bimetallism. But that is merely to say that there is no prospect of bimetallism being adopted at all; for the Americans are at least as well disposed towards bimetallism as the people of any other country.

The real objection to bimetallism with a high ratio is the same that Professor Gregory urges against any proposal for raising the gold price of silver without raising the gold price level, and that is the effect on the Chinese monetary situation. "It would involve drastic changes in the Chinese economic position, producing deflation and depression" (p. 38).

In his exposition of bimetallism Professor Gregory says that the market price of silver could not rise seriously above the price offered by the central banks, because silver "would be demanded from them." A bimetallic system in which the central bank could be compelled to sell one of the two metals on demand would be a novelty. It would seem to imply either that there should be separate issues of gold notes and silver notes, or that every note-holder should have the option of demanding gold or silver.

So long as the output of each metal substantially exceeds the industrial demand for it, neither device is necessary, for the surplus must be sold to the central banks and the market price cannot much exceed their buying price. But if the industrial demand for either metal exceeded the output, the price could only be kept down by sales from the central banks. R. G. H.

7.—*Le Franc d'aujourd'hui*, 1913–1931. *Sommes-nous riches?* By Georges Grand, Docteur en Droit, Trésorier-Payeur-Général-Honoraire. Paris: Giard. 1932. 9″ × 5½″. 141 pp. 20 *fr.*

On the first page of this book Dr. Grand refers to the need for an enlightened public opinion on financial questions, and is apparently writing rather for the general public than for the expert. Unfortunately the enlightenment given is only very partial, since in spite of a fair number of useful figures, the handling of the problems involved is incomplete. To take only one example, the author points out the obvious fact that depreciation favours the debtor in relation to the creditor, but he does not make it clear that in effect industry is thereby relieved of part of the burden of fixed charges and the State of part of the burden of the National debt. As for the question in the sub-title, "sommes nous riches?", the book does not begin to give any answer to the problem, though Dr. Grand is evidently not of this opinion. He deals with such questions as the rise in prices and changes in capital values in relation to the depreciation of the franc, but a study of these aspects of the economic life of a country cannot by themselves show whether it has grown wealthier or poorer. Changes in the real wealth of a nation can only be measured by changes in its productivity, in the standard of living or the accumulation of capital, matters which are hardly touched upon here. There is nothing from the first page to the last to suggest that France has become one of the great lending nations of the world, indeed the only reference to the balance of trade implies that she is a debtor nation.

When one comes to the last chapter one realizes that the book is in fact a piece of special pleading for the avoidance of war. Most of us will agree with the writer's aspirations, but are less likely to agree with his arguments. On the final page he concludes that war is robbery, since owing to the burden of taxation and inflation wealth is destroyed and " only the appearance of it left." Though taxation and inflated prices necessarily impoverish certain sections of the community, it is by no means as self-evident as Dr. Grand assumes that they necessarily impoverish the nation as a whole. W. A. E.

8.—*Growth of Trade and Industry in Modern India.* By C. N. Vakil, University Professor of Economics, Bombay, S. C. Bose, M.A., and P. V. Deolalkar, M.A., LL.B. Calcutta and London: Longmans, Green, 1931. 8½" × 5½". xii + 398 pp. 13*s*. 6*d*.

The foreign trade of any country is a fascinating study, owing to the fact that it is the resultant of so many economic forces and of conditions permanent and changing. The permanent conditions are mainly geographical; the changing are social or economic (in the narrow sense), the social influencing consumption, the economic, such as the accumulation of capital and diffusion of technical knowledge, influencing production. The foreign trade of any considerable country is thus the mirror of the stage of economic development it has reached, and at least an indication of international facilities of transport and of the state of industrial development of most other countries of the world. But the effects of the stage of economic advancement attained are dependent on the limitations, climatic, geographical, and political, which characterize the country, the last embracing tariffs, boycotts, and other intentional obstructions to trade. Foreign trade may be studied in all these aspects either from the historical point of view or in connection with present problems.

In no one book could the foreign trade of a country be dealt with in its various aspects; and the authors chose that which most interests thoughtful Indians—its relation to the agricultural and industrial development of India. The introduction, which treats of the economics of foreign trade with special reference to India, makes it clear that the chief concern of the authors is with the progress of Indian industries; and the benefits which India may obtain from foreign trade are assessed very largely in terms of its assistance or hindrance to that progress. The world-wide tendency of countries to foster the growth of manufacturing industries so as to use their natural resources and agricultural products is noted; and it is argued that, whilst small countries cannot aim at self-sufficiency, in the case of India, with its 320 millions of inhabitants and abundant natural resources of all kinds, a policy aiming at a much nearer approach to self-sufficiency will increase the welfare of the people.

A point made in the introduction is that the classical theory that the gains from international trade accrue to both countries needs modification in so far as the trade arises by the export from one of them of goods produced by industries financed and controlled by foreigners. Tea plantations, jute mills, and coal mines in India, for example, were until recent years almost entirely in British ownership. Hence the considerable profits arising from the export of their produce either arose abroad or were remitted abroad. The benefit to India from such trade was practically nil, for imports of machinery and mill stores were bought by English firms in India from England; and India reaped only incidental advantages, such as the employment found for coolie labour—though even this, one might add, may be neutralized by the social deterioration due to bad conditions of employment and housing. India, as a huge market, has assisted the growth of flourishing industries in other countries, *e.g.* in Lancashire, Japan (cotton and silk), and Java (sugar). India as a supplier of raw materials has promoted the growth of the jute industry in Dundee and elsewhere, cotton manufacture in Japan, the soap industry in France, and so forth, besides providing profitable business for foreign (*i.e.* mostly British) shipping, insurance, and banking houses. The conclusion is reached that discriminating protection as now administered with the advice of the Tariff Board needs early revision in favour of a more aggressive policy which will enable industries to develop at a much faster rate.

Consideration of the economic policy of India, which is to be the subject of the next volume in the series, presupposes acquaintance with the main facts regarding important branches of its trade and industry; hence the greater part of the present book is devoted to an exposition of the main features of foreign commerce in, and production in India of, a number of the principal articles exported and imported. There are sixteen chapters, most of which deal with one commodity or group of commodities each, and in the following order: wheat and rice, tea, coffee, sugar, cotton, jute, wool, silk, coal, the metals (chiefly iron and steel) and machinery, mineral oils, cement, matches, paper, oil seeds. Under most of these headings there is a history of the foreign trade in the commodity and of the growth of the corresponding industry in India, going back to 1860 in the case of the older industries. The war period is fully dealt with, as are the efforts of the Government of India after the war to develop Indian industries. The reports of the Tariff Board during the past ten years are quoted and criticized, and interesting information is given about the newer industries, such as petroleum, Portland cement, matches, and paper manufacture. Bias against English enterprise is apparent here and there, but is kept in check. The authors have made the book interesting, and it is generally reliable in spite of a number of misprints. It certainly has the merit of presenting much useful information within convenient compass. H. S. J.

9.—*The French Colonial Venture.* By Constant Southworth, Ph.D. London: P. S. King, 1931. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. xi + 204 pp., and tables. *12s. 6d.*

Starting with an account of a trip down the Senegal River in French Africa, the author leads up to the question why Europeans want to own uninviting regions like this, and soon plunges into a discussion of the economic significance of colonization, followed by an appraisal of the benefits reaped by France from her colonies, which is the main subject of the book. Realists may regard as fatuous any such attempt, because countries in this democratic age are but little concerned with the question whether colonies pay or not. To have colonies and dependencies is the mark of a world power; and no country having obtained them, and governed and sunk money in them, will voluntarily give any of them up. France certainly will not do so because Mr. Southworth proves they do not pay.

This is not to say that the book is not worth reading. On the contrary, the author gives much information and many figures about the French colonies collected from original sources (including hundreds of volumes of official accounts) which are not easily accessible. After an historical account of the acquisition and growth of the colonies he proceeds in Chapter III to a discussion of how to evaluate them. There follows a discussion of the budget system of the Republic and the colonies; and comprehensive figures are given showing the burden of military expenditure in the colonies and dependencies, and the subventions to and from colonies, the military expenditure being a direct charge in the republican budget. The French colonies do not control or pay for the French forces stationed there or for the native forces raised in the colony; but most colonies make a subvention to the Republic on account of military expenditure according to their capacity to pay, but less than the total cost. As there are special Treasury accounts outside the Republican budget concerned with special colonial expenses, it is difficult to trace the whole financial cost of the colonies to the home country.

The two following chapters contain, respectively, analyses of the gain from colonial trade and from investment in the colonies. As regards commodities imported from the colonies, the author seeks to answer the question whether France could obtain particular commodities, or satisfactory substitutes, as cheaply somewhere else in the world, *or* from her present colonies under other ownership, as she obtains them now from her colonies. He thinks she could. As regards exports, he notes that the possession of colonies has widened the market for French manufactures; and for textiles and some other kinds of goods this has meant a reduction of price to the consumer in France owing to the larger scale of production. He estimates the gain to the French consumers as 5 per cent. on half the total of exports; but this is pure guesswork, for the gain to the home consumer has in reality no relation to the value of exports. He does not investigate the actual profits of commerce with the colonies, except to some extent in the chapter on gains from investment, in which the dividends from a number of companies engaged in mining, estate development, and trading in the French colonies are examined.

The author makes out a heavy balance of loss to investors in colonial bonds by taking into account the effect on purchasing power of the depreciation of the franc. This seems a curious line of argument when investors in home securities suffered an equivalent loss; but in that case what the investor lost as an individual he gained as a taxpayer of the Republic. Mr. Southworth has given us a book which is full of interest and ideas. If much reliance cannot be placed on his conclusions, the book is yet one which cannot be ignored by students of colonial economic development. H. S. J.

10.—*Report of the Conference on Rail and Road Transport.* Ministry of Transport; London: H.M. Stationery Office, 1932. 9½" × 6". 85 pp. 1*s.* 3*d.*

When the Minister of Transport invited four representatives of road transport organizations to meet the managers of the four great railway groups in a friendly conference with Sir Arthur Salter in the chair, he can hardly have expected a unanimous report. In fact the report is unanimous without a single reservation, and the members of the Conference did not attain unanimity by enunciating platitudes or truisms. They have agreed upon a comprehensive policy dealing with the taxation, regulation, and licensing of commercial motor vehicles. By their terms of reference they were asked to consider the facts relating to the incidence of highway costs, and the contributions made by the different classes of motor vehicles, in order to establish what would be "a fair basis of competition and division of function between rail and road transport of goods." They were also asked what further regulations should be applied to goods transport, having regard to the interests of trade and industry.

As a basis the Conference reckoned the annual expenditure on roads at £60 million a year, and proceeded to distribute this sum between goods vehicles and all other motor vehicles in the proportion of £23½ million to the former and £36½ million to the latter. At present the smaller vans or lorries, if driven by petrol, make a substantial contribution to road costs and cause only a moderate amount of wear and tear, but the heavier vehicles are taxed at a lower rate per ton than the lighter vehicles, and there is a maximum licence duty but no maximum weight. So the present scale of licence duty resembles an income tax which should take 5*s.* in the pound from a clerk, 2*s.* 6*d.* from his employer, and 6*d.* from a millionaire. The Conference had no difficulty in deciding that the heavier vehicles should be made to pay very much higher licence duties, and it would differentiate against those which escape the petrol duty by burning coal or heavy oil. The new scales have naturally alarmed those who may have to pay them and they look at first sight arbitrary; but on examination they are found to be based on a careful calculation of ton-miles and petrol consumption.

At present there is a maximum licence duty, for ordinary vans and lorries weighing 5 tons or more unladen, of £60 for vehicles with hard tyres, and £48 for those with pneumatic tyres. Under the new scales the duty for a hard-tyred lorry weighing 9½ tons will be £282 if petrol-driven, £388 if driven by heavy oil, and £212 if driven by steam.

Pneumatic tyres reduce the duty by £40 or £50. Farmers and showmen get off more lightly, presumably on the ground that their vehicles travel shorter distances. Up to 3 tons petrol-driven lorries will pay about the same as at present, but those driven by heavy oil or steam will pay twice as much. Tractors will also pay much more than at present, 9 tons being rated at £155 instead of £50, or at £275 if driven by steam. In all cases there is an additional duty for every ton beyond 10. On trailers, which now pay £6 a year, the tax proposed is £16 without regard to weight, although one would expect that the principle of graduation according to weight should be applied to them also, since otherwise the motor owner could evade part of the new taxation by transferring weight from the tractor to the trailer. Next, the Conference proposes certain regulations for road vehicles with the aim of bringing them up to the standards imposed by Parliament on the railways. Motor owners will have to observe proper conditions of work and pay fair wages, and they must maintain their vehicles in a fit state. Following the line of the Royal Commission on Transport, the Conference proposes that separate licences should be issued for public hauliers and for "ancillary users," the latter not being allowed to carry any goods but their own except in vehicles licensed for a radius of 10 miles only.

If the new scales of licence duty and other regulations suggested by the Conference are adopted by Parliament, road and rail will compete on more equal terms than at present, and the older method of transport will not be able to allege that its young rival is subsidized by the ratepayer. But the Conference evidently hopes that the railways and road hauliers will agree to co-operate instead of competing, and that they will so organize their services as to attract the public "for all classes of traffic in which large-scale organization has great advantages." The new and elaborate calculations in the second half of the report should be of much interest to statisticians. For the first time Parliament possesses the necessary data on which to base the taxation of motor vehicles, or, if the word "taxation" seems to beg the question, to assess the contribution which they should make for their use and wear of the King's highway.

J. E. A.

11.—*Agricultural Depression and Farm Relief in England*, 1813–1852. By Leonard P. Adams. London: P. S. King, 1932. $7\frac{1}{2}'' \times 4\frac{3}{4}''$. xiv + 191 pp. 7*s.* 6*d.*

Since the time when the non-agricultural population of England began to concentrate itself in large towns and in particular districts of England, and farmers began to produce more and more for a market instead of for their local communities, agriculture has had its ups and downs in common with all commercialized forms of production. In general, the cycles of prosperity and depression have arisen from recurrent causes common to all industry, such as restrictions on trade and their relaxation, changes in the price level from inflation and deflation, political disturbances, changes in the quantity of production, and so on. In particular, such things as the development of cheap transport and the introduction of labour-saving machinery have added their effect to the general causes in more recent times. The burden of the farmers' complaints, as disclosed in Royal Commissions and other literature during the post-Napoleonic wars depression, the depression of the 'eighties and 'nineties of last century, and the depression of to-day, is the same, and it is possible to take any statement of it from any period and apply it to describe the conditions of any other.

Mr. Adams has selected for his thesis the depression which followed the fall of Napoleon, and it must be supposed that he hopes to shed some light upon the farmer's problems of to-day by a close analysis of the experiences of a hundred years ago and of the measures then adopted. But he comes to his task severely handicapped by lack of knowledge of English economic history before his period, and a want of familiarity with the progress of English farming from mediæval days. He writes of the "Industrial Revolution" and of the "Agricultural Revolution" as things that happened suddenly about 1800. He dates the beginning of the enclosure movement from the appointment of a Parliamentary Committee, in 1797, "to enquire into the state of waste and common lands in the United Kingdom." He talks of the substitution of wheat for rye as the bread food of the people, and says that under open-field farming the practice of grazing stubbles made it impossible to grow winter corn. He refers to the "ignorance of the general class of farmers and the obstinacy with which they clung to antiquated practices" at the beginning of the nineteenth century, when the only standard of comparison is that of the rest of Europe, which was far behind this country. On the other hand, the foundation of the Royal Agricultural Society, in 1840, is said to have brought "the general run of farmers into contact with the methods practised by the few progressives." In minor points, too, there is the same inaccuracy and sweeping generalization. "Lady Day, March 25th, was the most common time of entry to farms." But farms changed hands then, as now, at a great variety of dates, Michaelmas, Candlemas, Lady Day, and May Day, according to the district, and while Michaelmas and Lady Day account for the greater number, these were, as often they are still, "old" Michaelmas, Oct. 9th, and "old" Lady Day, April 6th.

The statistician will have much difficulty in accepting many of Mr. Adams' deductions from the available statistics. All through his thesis, the price averages during the Napoleonic wars are used as the basis for comparison, and the farmer's reactions to them so long as thirty years after, are suggested. Moreover, he is apt to select particular years in which the price average is exceptional in a run of years, leaving the reader with a wrong impression. For a short period in 1812, for example, wheat was sold, as Mr. Adams says, for 150*s*. per quarter, and he points to the fifty per cent. drop which occurred a few years later. But the average price for 1812 was no more than 126*s*. 6*d*., and this was exceptional, for the average of the five previous years was 83*s*., and for the five succeeding years 85*s*.

Still, as a study of what, as a good American, Mr. Adams calls Farm Relief, his book gathers together much useful information for a period of agricultural history which has not been so intensively examined before. It will be serviceable as supplying references to current controversies on political expedients designed to mitigate or overcome a period of depression. C. S. O.

12.—*Britain's Trade and Agriculture.* By Montague Fordham. London: Allen and Unwin, 1932. 7¾″ × 5″. 224 pp. *7s. 6d.*

A review of the whole field of production in agriculture and industry, with a diagnosis of the complaints from which both are suffering to-day, and prescriptions guaranteed to cure them, is a tall order. Mr. Fordham would have us believe that by scientific planning to control imports and prices it would be possible to regenerate agriculture and to absorb into it a great part of the urban unemployed—notwithstanding that few, if any, of them seem to be clamouring to participate in a back-to-the-land movement. Those left over, he thinks, would be speedily wanted again in their old jobs to supply the increased demand arising from his revivified rural England.

Mr. Fordham tackles his self-imposed task with all the courage and assurance that one has come to expect from him, and if his wholesale condemnation of economists, theoretical and practical, and of all the accepted canons of trade and commerce does not always carry conviction, his book at all events provides most stimulating reading. Even those who do not agree with him (and they will be the majority) cannot fail to enjoy the vigour of his writing or to appreciate his sincerity. C. S. O.

13.—*Co-operation in Marketing Dairy Products.* By R. W. Bartlett, Springfield, Ill. C. C. Thomas. (London: Baillière, Tindall & Cox). 1931. 9″ × 6″. viii + 299 pp. *21s.* net.

This somewhat expensive book is divided into two parts, the first being entitled "Aims and Agencies" and the second "Price Plans." The first part opens with a very brief review of the economic position of the dairy industry and leads on to the well-known arguments in favour of co-operative enterprise. Collective bargaining associations and those associations which process as well as bargain are given attention. The misuse (does the author mean "abuse"?) of bargaining power by some milk buyers, *e.g.* conniving with the Board of Health to penalize producers for minor offences in months of surplus production, and failing to pay for milk, is not, it is hoped, typical of American business methods.

Trends in retail distribution are discussed at comparative length and illustrated by a description of one or two interesting Producers' associations. Nearly one quarter of the butter output of the United States in 1928 was processed by co-operative associations. Chapter VII, dealing with Producers' membership relations, consists of a number of paragraphs the subjects of which include "types of leaders," "organization paper" (*i.e.* journal), "regional and local meetings," and in effect constitutes a series of hints on organization. The chapter discussing the agencies engaged in quality control is disappointingly brief and elementary. It is essentially descriptive of the popular methods, and might well have elaborated the administrative difficulties encountered in quality control and the degree to which all parties in the industry acknowledge agreement and authority. After dealing with problems of transport, Part I concludes with a survey of co-operation in dairy marketing in foreign countries. The extent of this survey is indicated by the fact that Danish co-operative marketing is covered within a page and a half and that of New Zealand within one page of text.

Part II, entitled "Price Plans," opens with a discussion of the economics of milk production and the trend of consumption over recent years. The paragraph dealing with the inelasticity of demand for milk is particularly interesting and could profitably have been expanded. The principle of paying the producer on the basis of the uses to which his production is put receives general consideration, and several illustrations are given. Combination price plans whereby the proceeds of the milk sales are returned to the farmer according to "each producer's contribution to the total market value" are also mentioned. Such principles appear to be very complicated in practice, and would surely be appreciated only by those farmers who have a statistical turn of mind. A brief criticism of these price plans completes the text, which is followed by nine appendices. Both parts of this book are concluded with a comprehensive bibliography, and each chapter finishes with "select references." The book is profusely illustrated with pictures and diagrams. Some of the photographs, *e.g.* "A group of producers, distributors and consumers at a price conference" (p. 28) or that showing a classroom of small children at their desks drinking milk through straws (p. 111) seem somewhat unnecessary.

As a popular descriptive work this book has merit; as a serious analysis of the complicated character of the milk market it is by no means advanced. R. F. G.

14.—*Economic Tracts for the Times.* By G. D. H. Cole. London: Macmillan & Co., Ltd. 1932. 8½″ × 5½″. vii + 327 pp. 12*s.* 6*d.*

This book contains fifteen papers, seven of which have not been reprinted before. They are grouped into three parts—"the economic crisis," "economics in theory and practice," and "socialization." The first deals with various aspects of monetary policy as revealed during the crisis, with free trade and tariffs, with the socialization of the banks, and with wages and employment. The second part discusses "a new economic theory," the use and abuse of economic terms, the nature of profits, and the abolition of the wage system. The third part treats of public and semi-public concerns, the essentials of socialization, the method of social legislation, and "Why I am a Socialist." It would not be unfair to describe the first and third parts as essentially propagandist, their criticism being designed to destroy the existing monetary and capitalist systems. That criticism is seldom unfair and generally well-based, and, however great may be dissent from Mr. Cole's proposals, defenders of the present economic structure will be well advised to repair the defects which he has laid bare. It is particularly interesting to observe how far socialist theory has moved from what one might call public department management of industry—the ideal current in the 'eighties and 'nineties. Now, independent management by non-political public bodies is seen to be a far more workable proposal.

The three parts of this volume really sketch out the groundwork for three books, and one wishes that Mr. Cole had this time written one of them in full. But the fertility of his mind apparently will not let him leave any problem untouched, even if it is immediately diverted to some other aspect of the economic world. Perhaps, however, all these scattered essays and prolegomena will be subsumed into the monumental work promised for this autumn—*The Intelligent Man's Guide through World Chaos.* If that work does not include the "new economic theory" sketched out in the book now under review, one would fain hope that Mr. Cole will take its completion as his next task. He proposes to begin by "an analysis of productive powers," and sets the economic problem as how "to organize the life of society so as to use these resources for the creation of the greatest utility." The free play of consumers' demand cannot be accepted as the sole directing force, for "it cannot be economically right for a community to leave usable productive resources unused, so long as there is *any* unsatisfied demand for the goods they can be used to produce, even if their employment will not yield a profit." Under "production" the economist will study physical resources, power-equipment, labour, and the technological conditions appropriate to the management of modern industry Under distribution he will have "to suggest means of securing an adequate and regular flow of incomes in relation to goods." The appropriate division of incomes has to be studied apart from the provision of capital, for the economist will have "to devise means for applying a part of (the possible) productivity to the development of capital resources apart from the distribution of incomes, and has then to arrange for a sufficient distribution of incomes to absorb the product destined for consumption at the prevailing prices." We end in "a regulated economy, based on the public control and direction of the processes of capital accumulation." To revert to an old and forgotten distinction, Mr. Cole seems to convert economics from a "science" to an "art." That need not be the less useful. He has given us an exciting overture; when shall we have the complete opera? Or is that the autumn production?

H. W. M.

15.—*Papers and Proceedings of the Fourth Annual Meeting of the Canadian Political Science Association.* Volume IV. Toronto, 1932. 10″ × 6½″. 268 pp.

In a prefatory note it is explained that the object of this Association is the "encouragement of the investigation and study of Political, Economic and Social Problems," and that, as in Canada matters of public policy are "as yet mainly economic," "economic topics predominate in the programmes of the annual meetings of the Association." The opening paper deals with "The Extent of Unemployment in Canada, 1929–32" in eight industrial groups—manufacturing, logging, mining, communications, transportation, construction, service, and trade. The aggregate percentage of unemployed persons rose from 8·5 per cent. in 1929 to 25·0 per cent. in 1931, and to 34·8 per cent. in the first quarter of 1932. It was most severe in logging (69·4 per cent. in 1931), construction (36·8), and manufacturing (25·6). Other papers dealing with unemployment are "Relief Works as a Remedy for Unemployment in Light of Ontario Experience, 1930–32," "Unemployment Insurance in Canada," and "The Rôle of Private Charity in Meeting Distress Due to Unemployment." Two papers on current problems in political science follow—"The Problem of a Commonwealth Tribunal" and "The Place of the Far Eastern Crisis in World Affairs." The presidential address, on "Some Phases of Early Canadian Railway Development," comes next, and is succeeded by three papers on Currency Problems—"The Automatic Gold Standard and the Necessary Modifications," "Currency Management in Canada," and "Empire Currency Proposals." There were three "round-table conferences" on "Public Finance," "Combines and Public Policy," and "Planned Economy," and there were still three more papers on "The Rise of National Parties in Canada," "The Party System in Canada," and "The St. Lawrence Waterway Project."

This young Association had thus a very full bill of fare for its two days' session, and its energy gives us great hope for its enduring success. It is a comforting feature in the present economic crisis that the various problems are being studied in different parts of the Empire in the light of local conditions and experience. Too much preoccupation with European conditions has led to some stagnation of thought, and a fresh breath from the West is to be welcomed. The good wishes of all students on this side of the Atlantic will go out to their Canadian brethren, with the full expectation that their researches and discussions will aid in the equitable settlement of the problems that torment the world. H. W. M.

16.—*Other New Publications.**

Canada; The Quantity of Manufacturing Production, 1923–1929. $8\frac{1}{2}'' \times 6''$. 53 pp. Ottawa: Dominion Bureau of Statistics, 1932.

[This brochure gives indices of the physical volume of manufacturing production in Canada which were compiled as the result of an investigation carried out by the Dominion Bureau of Statistics. Mr. R. H. Coats, the Dominion Statistician, has contributed the preface. The period covered was one of general expansion, and its middle year, 1926, was chosen as the base, the value added by manufacturing in that year being used for weighting the various industries. Although in some cases estimates had to be used in the absence of complete data, it is believed that the results are on the whole accurate, that they will be of especial value in making comparisons with the production of 1930 and 1931, and that they will enable it to be seen that the volume of production has not fallen to the extent that the decline in its declared value might suggest. The index and its construction are fully discussed in the preliminary pages, and the tables and charts are accompanied by concise explanation and comment. The second section examines the growth of manufactures "from the point of view of the purpose of the principal products of each industry"; we note that "Drink and Tobacco" and "Vehicles and Vessels" groups showed the largest increase and that the output of fruit and vegetable preparations increased 121.4 per cent against 21.8 per cent in breadstuffs and 10 per cent in dairy products. The volume of production of central electric stations receives special treatment, and the final table shows the number of wage-earners employed in each industry and their percentage variation in the period under review. Altogether, a most informative and interesting publication.]

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* *See also* "Additions to Library," p. 764.

Edge (P. Granville), O.B.E. Early Population Records in Spain. Reprinted from *Metron*, Vol. IX (1932), pp. 229–49.

[Major Edge tells us that "there exists in Spain a very considerable literature dealing directly or indirectly with the early population of that country," and he mentions accounts of the population compiled in the years 721 and 761 respectively. The present paper, however, is concerned with the work of Tomas Gonzalez, an ecclesiastic who was engaged from 1815 to 1828 in examining documents in the Royal Archives and made a special study of the population records he came across. The earliest of these refers to the households of the city of Baeza in 1407. Major Edge gives a brief summary of the various records, commenting on the figures and bringing the facts into relation with history, and ends by inviting other workers to enter this field "where they may discover abundant and dependable information which will enable us to attain a proper appreciation of conditions in far off times." A point of interest is that for purposes of calculation a family was in those times generally assumed to consist of five persons. The paper also appeared (in Spanish) in the *Boletin Tecnico de la Direccion General de Sanidad*, año VI (1931), No. 6.]

Grondona (L. St. Clare). Empire Stock-taking, 1932: an abridged revision of Empire stock-taking, 1930. 8½″ × 5½″. 84 pp. London: Haycock Press, 1932. 3s. *6d.*

[A useful analysis of official statistics of trade within the Empire. The statistical tables are divided into three main parts: I. Foodstuffs and raw materials (the needs of the United Kingdom and the supplies from the Overseas Empire). II. Manufactures (Imports into the Overseas Empire of the principal commodities, showing the proportions supplied by the United Kingdom). III. Overseas trade of the United Kingdom. The various tables are preceded by concise annotations summarizing the position of the different commodities in Empire trade, and the sources of the figures are furnished in a bibliography, key numbers to which are given in the tables. The reference value of the work is considerably enhanced by a detailed table of contents, and a brief but adequate index to commodities.]

Hoffman (Frederick L.), LL.D. San Francisco Cancer Survey. Seventh Preliminary Report. 9″ × 6″. 227 pp.

[This brochure contains thirteen reports and tabular summaries. The reports relate respectively to the cancer mortality, by occupations, of San Francisco (1920–27) and Boston (1920–26), the cancer mortality of Oakland (1924–28), East Orange (1926–30), Virginia (1926), Hot Springs, Ark., and of the New York State Hospital for the Insane (1924–29), to the geographical incidence of cancer, by organs and parts. The summary tables show the statistics of deaths by organs and parts, by average age, by known duration of disease, and by single years of life. The information is given entirely in tables, except for some brief preliminary paragraphs of explanation and commentary.]

Jevons (H. Stanley). The British Steel Industry. 8½″ × 5½″. 31 pp. London: Pitman, 1932. 1*s.* net.

[Mr. Jevons herein examines the present condition of the iron and steel industry. He diagnoses the causes of the depression, attributing the greatest responsibility to the price of the British product, and finally advocates the "replanning and gradual rebuilding of the whole of the heavy steel industry on a national scale, with plants larger than any yet built in Europe," with the aim of raising the annual production from the present figure of about 9 million to 25 million tons, and to produce at lower cost, "perhaps even at a lower cost than any other country." The necessary outlay for such reorganization is estimated at £150,000,000. It is emphasized that Great Britain has still many natural advantages for this industry, and that there is a "huge potential demand for iron and steel if only we reduce our prices sufficiently." Among the sources of this future demand are, in this country, the anticipated requirements in connexion with the electrification and reconstruction of the main railway lines and the substitution of steel for timber pit props; abroad, the need for structural steel in Empire territories such as Malaya, Burma, East and West Africa, British Guiana, and also "vast undeveloped territories outside the Empire, open to us if we quote competitive prices." The paper was originally contributed to Section F of the British Association last year, and the author has taken advantage of its reprinting to reply to some criticisms in a preface, or, rather, to reaffirm his belief on the grounds of his knowledge of the facts.]

Man (E. H.). The Andaman Islanders. 8¾″ × 6″. xxxii + 224 + 73 pp. London: Royal Anthropological Institute, 1932.

[This study of the aboriginal inhabitants of the Andaman Islands, their habits, customs, physical peculiarities, language, etc. (originally published in the *Journal of the Royal Anthropological Institute*), embodies the results of observations and researches made during the author's residence in the Islands from 1869 to 1880. Two appendices give respectively the weights and measurements of 48 male and 41 female Andamanese adults, and the earnings of the aborigines in the Andaman homes from April 1875 to March 1882. Other appendices are devoted to vocabularies of the Andamanese language. There is an index and a good map of the Islands.]

The Nomenclature of Diseases. Drawn up by a Joint Committee appointed by the Royal College of Physicians of London. 6th edition. 9½″ × 5¾″. xx + 220 pp. London: H.M. Stationery Office, 1931. 5*s.*

[The present is the fifth revision of this publication, the first edition of which was issued in 1869. Subsequent editions appeared in 1884, 1892, 1902, and 1917, and, as the title-page states, it is now subject to decennial revision. The preface gives the names of the revising Committee, of the Sub-committee on Classification, and of the specialists who undertook the preliminary revision of the different sections. The present edition includes a new sub-section on Infestation by Animal Parasites and Deficiency Diseases, while the section dealing with the Nervous System and Mental Diseases and the sections of the appendix relating to Parasites, Tumours, and Poisons have been entirely re-cast. The classified lists are followed by an alphabetical index.]

Peddie (J. Taylor). The Measure of Value: Solution of Gold and Silver Problems. 8¼″ × 5½″. 40 pp. London: P. S. King, 1932. 2*s.*

[During the last six or seven years Mr. Peddie has produced a number of books and brochures dealing with the same subject —his "dual stabilization theory," which gives the title to one of them. It might be said that he has throughout been thinking aloud, for many additions to and alterations from the original plan have now been made. In this last book he says, " I have definitely succeeded, through the evolution of the 'Symbolic Measure of Value,' in preventing gold from having any influence whatsoever on prices, which enables gold to be retained and used as a commodity.'']

Perieteanu (*Alexandre*). Traité de Mécanique Économique. 9″ × 5½″. 296 pp. Paris: M. Giard, 1932. 40 *frs*.

[The author characterizes current political economy as a mixture of science and art, empirically founded, employing a terminology insufficiently defined or understood, and attempting at the same time and by similar methods to determine quantitative facts and to attain practical objectives. He envisages the construction of an exact science of quantitative analysis which shall establish the principles upon which economic policy may be based. Contrary to expectations which might be aroused by the title, the book contains no formulæ or mathematical apparatus of any kind. It is an attempt to arrive by exact reasoning at an understanding of economic facts and to give a precise definition of the ideas which should be connoted by the special terms employed. The treatise is in two parts. The first relates to Production or the activities of mankind in the mass; it is divided into sections, headed respectively Abilities (Capacités), Work, the Activity of Production, and the Activity of Enjoyment. The second part, on Distribution, is concerned with the activities of men exercising choice as individuals in the disposition of the things produced, and is considered under the heads of: state regulation (*étatisme*) and liberalism, and of the national and international aspects of distribution, here called, respectively, *répartition juridique* and *répartition politique*, since the conditions of the one are determined by law and those of the other by political circumstances.]

Southampton: a City Survey, being a Report of the Civic Survey Committee of the Southampton Civic Society under the Chairmanship of *Brigadier E. M. Jack, C.B.* Edited by *P. Ford*, B.Sc. (Econ.). London: Oxford University Press, 1931. 14″ × 11″. 12 + 98 + 10 pp. 30*s*.

[As the preface states, this Report is somewhat different from the usual type of city survey, in that the Committee's work was specifically concerned with problems of town planning, regarded as " an endeavour to guide the town's growth to the light of the forces which shaped its past and will affect its future." The survey accordingly begins with a brief history of Southampton (to which is appended an etymological note on place and street names) and an account of the geology of the district. This forms a background to the survey of current conditions, which covers the lay-out of the land, port and dock development, employment and income, communications, population and housing, hospitals, recreation grounds, education, museums and libraries, and public utility services. The Borough Council's planning proposals are given in an appendix. The survey was carried out entirely by voluntary workers, each an expert in his subject, and the result, which bears witness to their zeal and ability, has been embodied in a pleasing volume, illustrated by excellent maps, plans, and photographs.]

CURRENT NOTES.

On another page we give our usual table summarizing the overseas trade of the United Kingdom for the years ended July 31st, 1931 and 1932. Imports during July were valued at £51·9 million, being £18·2 million (26·0 per cent.) less than in July, 1931. The corresponding declines in value for the first and second quarters of the year were 7·8 per cent. and 19·9 per cent. respectively. The value of the imports during July was smaller than that recorded for any month, apart from the early months of the war, since June, 1912. The value of the exports of British goods, £29,293,000, though less by £430,000 than in June, was just higher than in August, 1931, which was, apart from the early months of the war, the lowest month since April, 1909. Compared with a year ago, exports in July declined in value by 14·5 per cent., the corresponding declines for the first and second quarters being 10·7 per cent. and 1·2 per cent. Re-exports in July were valued at about one-third less than a year ago.

The excess of imports over exports of merchandise in July was £19·3 million, being £11·6 million less than a year earlier and £4·3 million less than in June. During the first seven months of the year the excess has been reduced by £51 million to £163 million. The July contribution towards this relative improvement in the merchandise balance was greater than that in any other month except April, when it amounted to £16·8 million.

As for the second quarter of the year, there was in July an excess of imports over exports of bullion and specie, imports amounting to £13·3 million and exports to £8·0 million. It may be recalled that in the corresponding month of last year there was the beginning of the drain of gold which ultimately led to the suspension of the gold standard, exports in July, 1931, exceeding imports by £26·4 million. As was shown in the *Board of Trade Journal* for February 18th, 1932, gold movements in recent years have been influenced by other causes than changes in merchandise trade. Imports and exports of bullion cannot, therefore, be added directly to imports and exports of merchandise in order to determine the visible "balance of trade."

Retained imports of food, drink, and tobacco in July were valued at £5,563,000 less than a year ago and £2,290,000 (7·6 per cent.) less than in June. Comparing the retained imports in July with those in the corresponding month of last year, there was in respect of grain and flour a decrease of 18 per cent. in quantity, due to smaller imports of each principal description of grain and flour except maize. Meat declined by 8 per cent., owing to smaller imports of mutton and lamb and of bacon. For the seven months ended July, while meat showed a decrease of less than 2 per cent., retained imports of grain and flour increased by 2 per cent., wheat increasing by over 5 per cent. and maize by 17 per cent., these increases being offset by a very large reduction in the quantity of barley imported and smaller reductions in respect of oats and wheat meal and flour. Imports of butter were about the same in July as a year earlier, and imports of cheese and of raw sugar were greater, but the quantity of eggs imported showed a substantial decline, these movements being very similar to those for the first half of the year. While retained imports of tea declined in July, for the seven months ended July there was an increase of about 11 per cent.

The value of the retained imports of raw materials was £2,017,000 less than in July, 1931, there being a decline, largely seasonal, of £1,814,000 compared with June. Nearly half the total decline in value compared with a year ago was in the wood and timber group, the quantity of hardwood imported and retained declining by 26 per cent. and of soft wood by 8 per cent., while pitprops increased by 2 per cent. Retained imports of raw cotton and of sheep's and lambs' wool were respectively 30 per cent. and 14 per cent. more than in July, 1931.

Total imports of manufactured articles were valued at £11,389,000 in July, substantially the same figure as that for each of the preceding three months, and 45·1 per cent. less than in July, 1931. Four groups showed declines of over £1,000,000 compared with a year ago, viz. miscellaneous manufactured articles, £1,306,000: apparel, £1,090,000; non-ferrous metals and manufactures thereof, £1,010,000; and iron and steel and manufactures thereof, £1,008,000; the proportionate declines varied from 55 per cent. for the miscellaneous manufactures to 67 per cent. for apparel. The heaviest proportionate declines were shown in respect of woollen and worsted yarns and manufactures, 82 per cent. (£858,000), and cotton yarns and manufactures, 75 per cent. (£515,000), while imports of silk yarns and manufactures declined by 60 per cent. (£367,000) and of manufactures of other textile materials by £621,000 (51 per cent.). These movements were very similar to those recorded for the second quarter of the year, as also was the increase in value shown by the manufactured oils group which includes refined petroleum.

The quantity of coal exported in July was 3,334,000 tons, being 6 per cent. less than a year earlier, but owing to an increase in the quantity of anthracite exported, the total value of the exports declined by only 4 per cent. This increase in the exports of anthracite, which for the first seven months of the year was 246,000 tons (13 per cent.), is due mainly to the quantity exported to Canada having increased from 454,000 tons to 623,000 tons. Exports of iron and steel goods as a whole were 6 per cent. less than in July, 1931, but there was an increase from 28,000 tons to 47,000 tons in the exports of rolling-mill products. As for the second quarter of the year, exports of machinery in July were about 2 per cent. higher than last year, exports of motor-cars showed a substantial increase and exports of motor-cycles a considerable decline.

Except for white goods, the exports of cotton piece goods were greater in July than a year earlier, the increase being particularly marked in exports of printed and dyed goods. Total exports of all descriptions of piece goods amounted to 198 million square yards or, within a little, as much as in any previous month of this year. Exports of cotton yarns, on the other hand, were smaller than in earlier months of this year or than in July, 1931. The quantity of woollen and worsted yarns exported was the same as in July, 1931, but there were decreases in the exports of woollen and worsted tissues, cordage, and linen and jute piece goods. Exports of artificial silk tissues showed an increase, and were larger than in any previous month this year. The quantity of paper and cardboard exported and of some chemicals was higher than in July, 1931, but generally speaking, apart from the instances quoted, exports during July failed to continue the improvement shown by the figures for the second quarter of the year.

The calculations regarding the volume and value of our overseas trade, which appeared in the *Board of Trade Journal* for July 21st, show the variations in the quantities of goods imported and exported during the second quarter of the year, eliminating the effect of price changes. The price changes have, in fact, been relatively small—for exports, average values during the second quarter were about the same as for the first quarter and 7 per cent. below those of a year earlier, while total imports declined by 4·5 per cent. and 9 per cent. respectively compared with these earlier periods.

Retained imports showed the following changes in volume compared with a year earlier :—Food, drink, and tobacco, an increase of 5·3 per cent. for the first quarter and a decrease of 1·8 per cent. for the second quarter; Raw materials, increases of 14·4 per cent. and 3·6 per cent. for the first and second quarters respectively; Manufactured goods, decreases of 22·6 per cent. and 38·7 per cent. respectively. For all articles there was practically no change for the first quarter, but a decrease of 11·9 per cent. for the second quarter. The smaller increase in raw materials for the second quarter of the year is to be regretted, indicating as it does that manufacturers do not

Movements and Classes.	Twelve Months ended July, 1931.	Twelve Months ended July, 1932.	Increase (+) or Decrease (—).
Imports, c.i.f.—	£'000.	£'000.	£'000.
Food, drink, and tobacco	434,713	398,062	— 36,651
Raw materials and articles mainly unmanufactured	192,819	169,726	— 23,093
Articles wholly or mainly manufactured ...	266,911	209,964	— 56,947
Other articles	10,663	8,358	— 2,305
Total Imports ...	905,106	786,110	—118,996
Exports, f.o.b.—			
United Kingdom Produce and Manufactures—			
Food, drink, and tobacco	41,327	33,412	— 7,915
Raw materials and articles mainly unmanufactured	51,646	44,742	— 6,904
Articles wholly or mainly manufactured ...	338,640	279,123	— 59,517
Other articles	16,952	14,807	— 2,145
Imported Merchandise—			
Food, drink, and tobacco	21,611	17,903	— 3,708
Raw materials and articles mainly unmanufactured	29,767	23,274	— 6,493
Articles wholly or mainly manufactured... ...	19,434	14,433	— 5,001
Other articles	725	415	— 310
Total Exports ...	520,102	428,109	— 91,993
Bullion and Specie—			
Imports	94,951	152,588	+ 57,637
Exports	111,912	151,252	+ 39,340

Movements of Shipping in the Foreign Trade—	Number of Vessels.	Thousand Net Tons.	Number of Vessels.	Thousand Net Tons.	Number of Vessels.	Thousand Net Tons.
Entered with cargoes—						
British	29,597	39,173	27,053	37,003	—2,544	—2,170
Foreign	25,196	22,207	24,579	21,355	— 617	— 852
Total entered ...	54,793	61,380	51,632	58,358	—3,161	—3,022
Cleared with cargoes—						
British	36,887	39,834	34,438	36,474	—2,449	—3,360
Foreign	20,658	21,362	19,164	19,234	—1,494	—2,128
Total cleared ...	57,545	61,196	53,602	55,708	—3,943	—5,488

anticipate any increase in production for export, the increase last quarter being hardly adequate to enable home manufacturers to make articles sufficient to replace the manufactures which, as a result of the tariff, are no longer being imported.

The volume of British exports last quarter was 6·4 per cent. greater than a year ago. For the first quarter there was a decrease of 1·1 per cent. Exports of coal showed decreases of 8·2 per cent. and 3·3 per cent. for the first and second quarters respectively, but for manufactured articles there were increases respectively of 1·3 per cent. and 10·9 per cent. The volume of exports of manufactured articles last quarter was greater than that in any quarter since the end of 1930, but more than 20 per cent. below the quarterly average for that year. The index numbers, based on the quarterly average of 1930 = 100, are as follows :—

	1931.	1932.
January–March	76·2	77·2
April–June	72·0	79·8
July–September	74·1	
October–December	74·4	

The figures would appear to indicate that there was a tendency towards recovery in the export trade in manufactured articles before the suspension of the gold standard in September, 1931, but that as a result of the better competitive position arising from that suspension there was a definite improvement during the first half of this year.

As measured by the Board of Trade index-number, general *wholesale prices*, which had advanced between 8 and 9 per cent. during October and November of last year, fell more or less continuously during the succeeding eight months, and in July, 1932, were about 8·2 per cent. below the level of November, 1931, and slightly below the level of prices obtaining during the first three weeks of September, 1931. There was, however, a noticeable rise during July, 1932, in the prices of various materials, which was masked by the continued fall in the prices of articles of food. The rise in materials was fairly steady throughout the month and was most marked in cotton and wool. It may have been due to some extent to speculative action and partly, perhaps, to a drop in the exchange value of sterling; but the rise had not been arrested during the first fortnight in August. Compared with May, 1932, the index-number for articles of food shows a fall of 2·8 per cent. in June, and a similar fall is shown in July over the month of June. On the other hand, the prices of materials which fell 2·6 per cent. in

June rose 1·1 per cent. in July, and judging by later information are still showing a tendency to advance. Prices are, however, as a whole 4·3 per cent. below the level of July, 1931, food prices being nearly 1 per cent. and prices of materials nearly 6 per cent. lower. The group index-numbers on the three bases now given by the Board of Trade are set out below:—

Base Year	Month	Food	Not Food	Total
	May	90·3	81·2	84·3
1930 = 100	June	87·8	79·1	82·0
	July	85·3	80·0	81·8
	May	68·8	56·5	60·6
1924 = 100	June	67·1	55·0	59·0
	July	64·9	55·7	58·8
	May	114·4	93·8	100·7
1913 = 100	June	111·6	91·3	98·1
	July	108·0	92·4	97·7

The *Economist* index-number (1927 = 100) at the beginning of June stood at 60·5 and had fallen by July 13 to 58·9, or 2·6 per cent. On August 10, however, the number had advanced to 61·0, a rise of 3·4 per cent., and increases were shown in all groups of articles except "Cereals and Meat," the index-number for which on the last-mentioned date stood at 67·9 compared with 72·4 at June 1. All groups composing the index-number, with the exception of Textiles and "Minerals," still show some slight decline as compared with the end of July, 1931.

General prices as measured by the *Statist* showed a fall in June of nearly 4 per cent. and a rise in July of 2·4 per cent., the index-numbers (1867–77 = 100) at the end of the months May, June, and July, 1932, being 80·2, 77·0, and 78·9 respectively. At the end of July, 1931, the number stood at 80·2.

The general change in prices in the United Kingdom since the end of August, 1931, is compared with the changes in the gold standard countries in the table below.

(1913 = 100.)

	Board of Trade	*Economist*	*Statist.*	U.S.A. (Bradstreet)	France (Stat. Gen.)	Germany (Stat Reichsamt)
August, 1931	99·5	85·7	93·1	92·2	455	110·2
July, 1932 ...	97·7	83·9*	92·8	73·8	404	95·9

* August 10th, 1932.

The rise in *shipping freights* which took place in February and March of this year has not been maintained, and since the latter month there has been a more or less continued fall, slight in April but more pronounced in each of the three following months. According to the index-number compiled by the Chamber of Shipping, freights in July, 1932, showed a fall of 2·5 per cent. compared with June, and of 14·2 per cent. compared with May. The fall registered since March, 1932, has been as much as 18·4 per cent. The index-numbers (1920 = 100) for the three months May, June, and July, 1932, were 19·4, 17·1, and 16·7 respectively. Freights in the last-named month were rather more than 9 per cent. below the level of July, 1931, and the decline in the volume of business done is as noticeable as the fall in rates.

The monthly valuation of *Stock Exchange Securities* measured by the *Bankers' Magazine* shows that the rise in the value of Fixed Interest Stocks, which has been practically continuous since December, 1931, was accentuated during July, doubtless owing principally to the Government Conversion Scheme, and that the prices of the selected Variable Dividend Securities, which had on the whole been steadily falling over the same period, rose noticeably during the month. The only securities not registering a general advance were British Railway Ordinary Stocks and United States Railway Shares. The index-numbers (December, 1921 = 100) for September, 1931, and for recent months are given below.

	Fixed Interest Stocks.	Variable Dividend Securities.	Total.
September 20, 1931	103·5	89·5	99·0
December, 1931	102·2	90·7	98·5
May 20, 1932...	111·4	82·0	101·8
June 20, 1932	111·0	78·9	100·6
July 20, 1932	115·6	84·5	105·5

As calculated by the Ministry of Labour index-number of retail prices of articles of working-class consumption, prices of articles of food are now lower than at any time since February, 1915. At the first of June, 1932, they were only 23 per cent. above the level of July, 1914, and though a slight increase took place during the month and prices rose to 25 per cent. by July 1, the advance was not sustained, and at August 1 food prices were back at the level of June 1. The only fall of any considerable magnitude was in the price of potatoes. During the same two months the prices of other articles of working-class consumption, *e.g.* clothing, fuel and light, etc., showed a slight fall, so that, at August 1, 1932, the general index-number of the cost of living stood at 141, or only 41 per cent. above the level of July, 1914, a figure lower than at any time since May 1, 1916. The index-number for the cost of clothing is estimated to have fallen from 190 to 185–190, that for fuel and light from 170 to 165–170, and that for other items from 175 to 170–175, and the quotations of ranges are no doubt an indication of the increasing difficulty of estimating closely real changes in the prices of articles which tend to vary so greatly in fashion and quality and are affected also by gradual alteration in habits.

Index-numbers of Cost of Living.

(July, 1914 = 100.)

	Sept. 1, 1931	June 1, 1932.	July 1, 1932.	Aug. 2, 1932.
Food prices	128	123	125	123
All items (food, clothing, rent, fuel, etc.)	145	142	143	141
All items (a year earlier)	157	145	147	145

The returns relating to the amount of *retail sales* prepared by the Incorporated Association of Retail Distributors and the Bank of England and published in the *Board of Trade Journal* continue to show each month a decline compared with the corresponding month in 1931. The money value of sales declined 3·8 per cent. in June, 1932, and 6·3 per cent. in July, 1932, that of articles of food declining 3·0 and 2·6 per cent. and that of other merchandise 4·9 and 9·9 per cent. in the months named. Over the six months February to July, 1932, the decline in total sales was 4·8 per cent. compared with the corresponding six months of 1931. The decline has been greatest on the whole in the London Central, West End, and Suburban London areas.

The following table gives for the principal countries the percentage increases, in July, 1931, and on the latest available date, of the retail prices of food and other articles compared with the prices at about July, 1914:—

Country.	Retail Prices of Food at		Retail Prices of All Items at		Date of Latest Return. 1932.
	July, 1931.	Latest Date available.	July, 1931.	Latest Date available.	
Great Britain	30	23	47	41	Aug. 2
Overseas Dominions.					
Australia	25	23	25 †	23 ‡	June
Canada	10	−8	37	25	July
Irish Free State	43 * ‖	44	57 *	59	May
New Zealand	18	11	45	39	June
South Africa	4	−4	22	18	June
Foreign Countries.					
Belgium	—	—	689	608	June
Czechoslovakia	18	9	4	4	June
Denmark	19	15	54	54	July
Egypt (Cairo)	16 §	16 §	34	30	June
Finland	718	741	904	886	June
France (Paris)	517	447	465	435 **	July
Germany	30	14	37	22	July
Holland (Amsterdam) ...	—	—	54	41	June
Italy	342	330 (June)	—	276	Jan.–June
Norway	40	33	52	49	June
Poland (Warsaw) ...	—	—	0	−9	July
Spain (Madrid)	93	79	—	—	June
Sweden ¶	30	27	58	56	July
Switzerland	40	25	50	38	June
United States	17	−2	50	46 (Dec. 1931)	June

* Figure for August, 1931. † Third quarter, 1931. ‡ Fourth quarter, 1931. § Includes fuel and light, figure for February. ‖ Figure for June, 1932. ¶ Includes fuel and light. ** Second quarter, 1932.

There has not, unfortunately, been any improvement in employment during the months of June and July, 1932, and unemployment is now appreciably worse than at the beginning of the year. The proportion unemployed in the insured trades in Great Britain, which was 20·8 per cent. at December 21, 1931, rose to 22·3 per cent. at the end of January, 1932, and fell to 20·8 per cent. at the end of March, since when there has been a gradual rise, until at the end of July, 1932, the figure stood at 22·7 per cent. At the end of July, 1931, the proportion unemployed was 22·5 per cent. The only group of trades that showed a noticeable improvement at the end of July compared with a year ago was the textile group (with the exception of linen), although some slight decrease in unemployment took place in the chemical and pottery trades. In the textile trades, moreover, employment is not so good as in the earlier months of the year.

The monthly figures issued by the Ministry of Labour showing the numbers on the registers of Employment Exchanges are below :—

Date.	Wholly Unemployed.	Temporarily Stopped.	Persons normally in Casual Employment.	Total.
December 21, 1931 ...	2,002,464	403,432	104,025	2,509,921
January 25, 1932 ...	2,131,298	496,298	100,705	2,728,411
February 22, 1932 ...	2,112,927	486,599	101,647	2,701,173
March 21, 1932 ...	2,042,444	422,676	102,212	2,567,332
April 25, 1932 ...	2,031,888	516,563	103,730	2,652,181
May 23, 1932 ...	2,001,127	630,664	109,515	2,741,306
June 27, 1932 ...	1,961,769	683,378	97,196	2,747,343
July 25, 1932 ...	1,995,453	721,552	94,777	2,811,782
July 27, 1931 ...	*1,877,543*	*724,690*	*111,117*	*2,713,350*

It will be seen that the numbers registered as unemployed were at the end of July over 300,000 in excess of those at the end of December, 1931, and nearly 100,000 more than at the end of July, 1931. In this connection there has also to be born in mind the statement of the Ministry of Labour, that recent changes in the scheme of unemployment insurance and certain changes in the method of counting dock-workers included in the figures had caused a reduction at July 25, 1932, of approximately 170,000 in the number of insured persons recorded as unemployed.

Unemployment in Germany has declined during the months June and July, 1932, and at the end of the latter month the numbers returned as definitely unemployed were 736,000 below those for the end of February and about 190,000 below the figure for the end of May. The actual number out of work, however, is still at the high figure of 5,392,000. Of these the number in receipt of standard or emergency benefit was 2,111,000 compared with 2,658,000 at the end of May.

The returns from German trade unions covering between three and four million members do not show so noticeable a fall during the year. The proportion unemployed at the end of June was still as high as 43·1 per cent. compared with 44·6 per cent. in March—the highest rate recorded in the present year. The proportion on short time shows little change, being 22·9 per cent. and 22·4 per cent. at the end of May and June respectively.

In France there has been during May, June and July some slight reduction in the numbers on the registers of Employment Exchanges (from 337,386 at the end of April to 296,401 at end of July); but according to the special monthly investigation into mining, industrial transport, and commercial undertakings, employing at least 100 workers each, the numbers employed at the beginning of June, 1932, were 13·37 per cent. below those of June, 1931. Moreover, 51 per cent. were working more or less on short time. Since this monthly inquiry was instituted at the beginning of 1931, there has been each month a decline in the numbers employed as compared with the numbers employed twelve months before, and during the last six months the decline has averaged 14 per cent.

In Belgium, out of about 850,000 members of 172 Unemployment Insurance Funds, 18·9 per cent. were totally unemployed at the end of the month of May as compared with 21·3 per cent. at the end of February. There has, however, been little change in the number intermittently employed during the month, which for May was 22·5 per cent.

In Italy employment has slowly improved during the five months ended June, 1932, and at the end of that month, according to statistics of the National Social Insurance Fund, the number recorded as unemployed had fallen to 905,097 compared with 1,000,025 at the end of April and 1,147,945 at the end of February, 1932. At the end of June, 1931, 573,593 were recorded as unemployed.

In Denmark employment has improved and the rate of unemployment at the end of June, 1932 (according to returns from the Central Employment Exchange and the Unemployment Insurance Funds), was 25·6 per cent. compared with 35·8 per cent. at the end of March. At the end of June, 1931, the figure was 11·3 per cent., and the proportion out of work has shown a continuous rise from that month up to February and March of this year. In Sweden, according to returns from trade unions, 19·1 per cent. of their members were unemployed at the end of June, 1932, as compared with 20·5 per cent. at the end of April and 12·4 per cent. at the end of June, 1931. In Norway the rate of unemployment among members of trade unions was 24·6 per cent. at the end of May, and has varied very little during the year, the average rate being 24·7 per cent. At the end of May, 1931, it was 17·1 per cent.

In both Austria and Poland the numbers in receipt of unemployment benefit have declined since the earlier months of the year and employment has apparently improved, but is not so good as in the corresponding period of 1931.

According to the index-number of employment in manufacturing industries prepared by the Federal Bureau of Labour in the United States, unemployment has continued to increase during the first six months of this year. The index-number (average of 1926 = 100) was 59·7 for May and 57·5 for June, and these are the lowest figures yet recorded. According to returns received by the Bureau from sixteen principal industrial groups (including manufacturing industries) employing about 4,250,000 workpeople, there was a decrease of 3·0 per cent. in the numbers employed and 6·4 per cent. in the aggregate earnings in June, 1932, as compared with the previous month. Similar decreases of greater or less extent have been recorded almost continuously since the autumn of 1929. The American Federation of Labour reported that at the beginning of July in twenty-four cities affiliated trade unions reported 34 per cent. of their members as unemployed. The average rate for the previous twenty-four months was 31 per cent.

In Canada there has been very little change in the volume of unemployment during the year, and at the beginning of July, 1932, the index-number of employment issued by the Dominion Bureau of Statistics was 88·7 (average of 1926 = 100). The average figure for the first six months of the year was 88·5 and at the beginning of July, 1931, was 103·8.

The recent rise in wholesale prices may be the prelude to improved industrial conditions, but the statistics of unemployment at present available do not point to any hope of an immediate appreciable reduction in the numbers out of work in any country. The usual improvement shown in the months of spring and early summer is hard to find.

The Economic Series of the Ministry of Agriculture continues to expand. Part II of the Report on the Marketing of Dairy Produce in England and Wales (No. 30) deals with butter and cream. The chapter on "quality control" overseas is of particular interest, and clearly illustrates the highly developed organization whereby countries abroad maintain a hold on the British market. The desirability of greater uniformity in the quality of home-produced butter is emphasized, and it is suggested that this would be largely achieved by centralization of manufacture, which would do much to improve the marketing organization as well.

The Report on the Organization of Wool Marketing (No. 35) "aims at presenting, as a basis for consideration, the outline of a constructive programme of marketing organization." After a brief survey of world production, consumption and prices, the methods of assembling the home clip are discussed and the marketing organization overseas is described. Reorganization in England and Wales is considered in Part IV, and 22 pages of tables and appendices finish the Report. Both these publications compel attention and are creditable additions to this well-established series.

The Department of Agriculture for Scotland has issued the Second Report on the Profitableness of Farming in Scotland, thus well justifying the hope expressed on p. 335, Vol. XCV of the *Journal*. In this Second Report, the financial results of certain farms in 1929-30 are discussed and briefly compared with those for the previous year. Over the two years, 87 farms are considered, of which 54 did worse and 33 did better in the second than in the first year. Average trading account profits for the arable farms in the Eastern Area were less in 1929-30 than in 1928-29 by £378. Only the semi-arable sheep farms of the Border counties did better, as a group, the increased average trading profit being £84.

The Actuarial Society of America and the Association of Life Insurance Medical Directors have recently added a supplement to their Medical Impairment Study published in 1929. The present volume deals with the effect upon mortality of a family history of tuberculosis, the influence of build on mortality and the mortality on policies for large amounts. The first two sections contain, in detail, material of considerable interest to the vital statistician. The method of presentation is the comparison of observed deaths with those expected on the basis of a standard table, and the material is sufficient for quite a number of sub-divisions to be taken, *e.g.* in examining the effect of a tuberculosis history the analysis is extended to the number of cases of tuberculosis in the family, the build and the age of the insured. In cases with a family history of tuberculosis, combining all weights, the ratio of actual to expected deaths in this experience was, 134 per cent. at ages 15–29 years, 91 per cent. at 30–44 and 85 at 45 and over. In the underweight section the death rate from tuberculosis of the lungs was 2¼ times the normal. Among those of average weight or overweight it was slightly below normal. In general, these results agree with those found in the Medico-Actuarial Mortality Investigation made before the war.

In studying the influence of build upon mortality, particular attention has been paid to the youngest ages at entry (under 20 years), for which previous material is scanty. Amongst overweights the death rate was high from diabetes, cerebral hæmorrhage and apoplexy, organic disease of the heart, cirrhosis of the liver, nephritis, Bright's disease and appendicitis.

In the final section it is shown that among holders of large amounts of insurance the death rate from violence, that is accidents and suicides, is greatly in excess of the expected.

The Medical Research Council have added to their series of studies in nutrition an Inquiry into the Diet of Families in Cardiff and Reading, which has been carried out by Professor Cathcart and his colleagues (M.R.C. Special Report Series No. 165, price 6*d.*, 1932). The investigation follows the customary procedure of making accurate studies of the nature of the diet consumed by a sample of families of the industrial class (56 in Cardiff, 57 in Reading) and analyzing them from the quantitative aspect. Variations in the diets in relation to economic circumstances are also considered in some detail. As in the previous study of St. Andrew's families, these figures show considerable divergence from those which have been set up in the past as representing the average diet. In particular, an unexpectedly high consumption of fat is shown, the proportion of the diet derived from this source being appreciably higher than in the previous studies of the artisan Scottish families. Accurate knowledge on points such as these is essential, it is pointed out in the preface, for the proper application of the results of nutritional science to the practical problems of diet in health and disease. Judging from the state of the physique of the somewhat limited number of children available in the families studied, there was no evidence of the existence of serious malnutrition.

In a paper contributed to the Proceedings of the Royal Society of Medicine, Major P. Granville Edge draws attention to the need for the collection of accurate data with respect to native populations in tropical and other backward territories. "If our medical and administrative authorities in the tropics are to direct efficiently, and to systematize, the efforts which they devote to the protection of the population from the innumerable causes of ill-health . . . and at the same time are to justify the time and expenditure which such services demand, they will need to have at their disposal complete and accurate vital records. . . ." It is suggested that the well-known difficulties of census-taking among such peoples might be got over by the expedient of making a succession of small-scale investigations, each confined to a few questions within limited areas. The result of a complete census could ultimately be arrived at and the accustoming of the population to official enquiries would lead to improvement in accuracy and to the possibility of more extensive and particular investigations in the future. In order to encourage our colonial administrators, Major Edge points to the statistics provided by the Dutch authorities with respect to the East India populations and what is being done by the French in their colonial possessions.

The Institute of Economics of Nankai University, Tientsin, is now publishing a Quarterly Journal of Economics and Statistics, of which a specimen issue (Vol. I, No. 2, June, 1932) has reached the Society. The text is entirely Chinese, but a list of contents in English on the back cover enables us to state that the principal articles are: Population Movement to the North-Eastern Provinces in China, by Franklin L. Ho; Industrialization and Labour in Hopei, by H. D. Fong; On the Formulæ for Cost of Living Index-Numbers, by Tayeh Wu. Regular features are a weekly index number of the cost of living in Tientsin, a review of conditions in the previous quarter, and a statistical appendix giving various price and cost of living indices, bank clearings, interest and foreign exchange rates, etc. The figures in these tables are arabic, but all the headings Chinese.

As we go to press we learn, with the deepest regret, of the death of Dr. T. H. C. Stevenson, C.B.E., lately of the General Register Office. Dr. Stevenson had been a Fellow of the Society since 1908, had served on the Council and as Honorary Secretary, and contributed valuable and original papers to the Society's Proceedings. In 1920 he was awarded the Guy Medal in gold. A biographical notice will appear in the next number of the *Journal.*

OBITUARY

PROFESSOR VIGAND ANDREAS FALBE-HANSEN

Born 23 Sept., 1841; died 28 Mar., 1932

THE Royal Statistical Society has lost by the death of Professor Falbe-Hansen, which occurred on 28th March last, at the age of 90 years, the senior of its Honorary Fellows, senior both in age and in the duration of his association with the Society, his election having taken place in 1878. In his long and active life, Falbe-Hansen took a leading position both in official statistics and in academic work. He was on the staff of the statistical office of the Danish Government from 1870 until, after being for two years the responsible head of the office, he became, in 1877, Professor of Political Economy in the University of Copenhagen. A quarter of a century later, on resigning his professorship, he was for a second period of two years again in charge of the statistical office. During the earlier of his two periods as official statistician, he planned important extensions of the work of the office into fields not, up to that time, developed. The side of the work which interested him most was that connected with agriculture, and his activities in relation to that side of Danish economic life were maintained after he left the civil service for the University. His best writings were concerned with agricultural reform.

Falbe-Hansen belonged to the liberal school of Economists, as illustrated in French thought of the period. With the more modern developments of economic theory he had, however, little sympathy. After his second period as official statistician, he devoted himself to the development of the insurance company "Danmark," particularly on the side of life insurance, and as an administrator showed himself rich in initiative and possessed of a keen insight into the drift of affairs. For short periods he was a member of the lower house (1881–84) and of the upper house (1909–18) of the Danish parliament, but took no prominent share in party politics. As a member of various commissions he rendered useful and important public service and, both before and after his entry into academic work, was responsible, alone or in association with others, for a number of works dealing with the economic questions of his age, and for collections of statistical material, as well as for many shorter economic discussions in scientific journals or in the Press. To the last he maintained a keen interest in the economic problems which post-war developments have presented in such abundance. From 1903 to 1924 he was a member of the International Institute of Statistics.

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Bankers' Magazine, September, 1932—The progress of banking in Great Britain and Ireland during 1931. How can we restore international solvency? *Gustav Cassel.*

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Eugenics Review, July, 1932—Family allowances: *R. A. Fisher.* Mental deficiency on Merseyside: *D. Caradog Jones.*

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August, 1932—Labor productivity and displacement in the electric light and power industry.

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BELGIUM—

Revue du Travail—

July, 1932—Les groupements d'échange d'expériences: *Emile Bernheim.*

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DENMARK—

Nationaløkonomisk Tidsskrift, Hefte 4, 1932—En Kritik af den klassiske Omkostningsteori i Belysning af nyere Litteratur: *Niels Lindberg.* Grundrentens Størrelse og lokalisering i Danmark: *Abel Brink.*

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Bulletin de Statistique et de Législation Comparée, February, 1932—La production des alcools en 1930–31. Le recensement de la population de la France et de l'Algérie en 1931.

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Vierteljahrshefte zur Konjunkturforschung, Heft 2, 1932—

Teil A—Die weltwirtschaftliche Konjunktur. Die volkswirtschaftliche Konjunktur.

Teil B—Die Konjunktur einzelner Wirtschaftszweige. Wirtschaftszahlen des in- und Auslands.

ITALY—

Le Assicurazioni Sociali, May–June, 1932—I rimedi della disoccupazione nell' ordine internazionale: *Giuseppe de Michelis.*

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La solidarietà sociale attraverso l'assistenza promossa dal Partito Nazionale Fascista: *Arturo Marpicati.* Razionalizzazione e disoccupazione: *L. Urwick.* Provvedimenti di assicurazione sociale su base commerciale: *Joseph L. Cohen.* (A Supplement contains the first two of these articles in French and the last two in English.)

Giornale degli Economisti e Rivista di Statistica, June, 1932—Contributo allo studio degli effetti dell' imposta generale sul reddito: *Renzo Fubini.* I consorzi industriali in Italia: *Guido Peja.*

Giornale dell' Istituto Italiano degli Attuari, July, 1932—Tavola europea di mortalità: *P. Smolensky.* La distribuzione dei decessi secondo la legge di Gauss: *E. J. Gumbel.* Le cause d'invalidità degli assicurati riconoscuti invalidi dall' Istituto Nazionale delle Assicurazioni: *I. Romanelli.*

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Journal de Statistique et Revue Économique Suisse, Fasc. 2, 1932—Zur Problematik der freien und gebundenen Wirtschaft: Ideologie und Wirklichkeit: *E. Böhler.* Notwendigkeit und Möglichkeit einer Planwirtschaft: *Max Weber.* Betriebskosten Schweizerischer Irrenanstalten 1921 bis 1930: *W. Grütter-Mojon.* L'évolution du taux général de la mortalité en Suisse depuis le début du 20e siècle et les perspectives de l'accroissement naturel de la population suisse: *Liebmann Hersch.* Die unvollständige und die zerrüttete Familie als soziologisches, pädagogisches und fürsorgerisches Problem: *Emma Steiger.*

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July, 1932—Alfred Thomas, the first Director: *H. B. Butler.* Under-consumption as a factor in the economic cycle: *Maurice Ansiaux.* The organization of public works and other measures for the relief of unemployment in Sweden: *E. G. Huss.* The standard working week in Australia: I.: *O. de R. Foenander.*

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ADDITIONS TO THE LIBRARY.

Since the issue of Part III, 1932, the Society has received the publications enumerated below:—

I.—OFFICIAL PUBLICATIONS.

(a) United Kingdom and its several Divisions.

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Economic Advisory Committee. Committee on locust control. 4th report. London: H.M.S.O., 1932. 9½″ × 6″; 43 pp. 1*s.*

Empire Marketing Board—

Reports: 49. Fruit supplies in 1931. 116 pp.; 50. The demand for honey. 67 pp.; 51. Milk price margins . . . 86 pp.; 52. Dairy produce supplies in 1931. 116 pp.; 54. Survey of vegetable oil-seeds and oils. Vol. I. Oil palm products. 134 pp.; 55. Canned and dried fruit supplies in 1931. 124 pp.; 56. The demand for canned vegetables. 36 pp. [London: H.M.S.O., 1932. 9¾″ × 7¼″. 1*s.* each.]

Series C, No. 1. Dairy produce: a summary of figures of production and trade relating to butter, cheese, preserved milk, eggs, egg products. 32 pp.

—— No. 2. Grain crops; a summary of figures of production and trade relating to wheat, wheat flour, barley, oats, maize, rice, rye. 48 pp. [London: H.M.S.O., 1932. 9¾″ × 7¼″. 6*d.* each.]

General Register Office—

Census of England and Wales, 1931. County of Essex (Part I). xxi + 62 pp. 4*s.* County of Surrey (Part I). 44 pp. 3*s.* County of Middlesex (Part I). xxi + 38 pp. 3*s.* [London: H.M.S.O., 1932. 13¼″ × 8″.]

Health, Ministry of. Final report of the Departmental Committee on Maternal Mortality and Morbidity. London: H.M.S.O., 1932. 9¾″ × 6″; 156 pp. 2*s.* 6*d.*

Home Office. Report of the Departmental Committee on Persistent Offenders. London: H.M.S.O., 1932. 9½″ × 6″; 82 pp. 1*s.* 6*d.*

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Medical Research Council. Special report series. No. 168. Alcohol and inheritance: an experimental study, by *F. M. Durham* and *H. M. Woods.* London: H.M.S.O., 1932. 9½″ × 6″; 63 pp. 1*s.* 3*d.*

Overseas Trade, Department of—

Reports on commercial, financial, and economic conditions: 517. Bulgaria, 80 pp. 2*s.* 6*d.* 518. Cuba, 36 pp. 1*s.* 519. Turkey, 46 pp. 1*s.* 6*d.* 520. Latvia, 30 pp. 1*s.* 521. Yugoslavia, 36 pp. 1*s.* 522. Switzerland, 57 pp. 1*s.* 6*d.* 523. Sweden, 66 pp. 2*s.* 524. Syria, 42 pp. 1*s.* 6*d.* [London: H.M.S.O., 1932. 9½″ × 6″.]

Trade, Board of—

Industrial surveys: Merseyside, made . . . by the University of Liverpool. 174 pp. 2*s.* 6*d.* South Wales, made . . . by University College of South Wales and Monmouthshire. 180 pp. 3*s.* 6*d.* Lancashire area (excluding Merseyside), made . . . by the University of Manchester. 380 pp. 6*s.* North-east Coast area, made . . . by Armstrong College (University of Durham). 505 pp. 7*s.* 6*d.* South-west of Scotland, made . . . by the Staff of the Political Economy Department of the University of Glasgow. 220 pp. 4*s.* 6*d.* [London: H.M.S.O., 1932. 9½″ × 6″.]

(a) United Kingdom and its several Divisions—*Contd.*

United Kingdom—*Contd.*

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First report of the Committee of Inquiry into London Motor Coach Services, 18th June, 1932. London: H.M.S.O., 1932. 9½″ × 6″; 58 pp 2*s.* 6*d.*

Report of the Conference on Rail and Road Transport, 29th June, 1932. London. H M.S O, 1932. 9½″ × 6″; 85 pp. 1*s* 3*d.*

Scotland—

Census Office. Census of Scotland, 1931 Vol. 1. Part 5. County of Aberdeen Edinburgh · H M S O., 1932. 13¼″ × 8¼″; [54] pp 2*s.* 6*d.*

(b) India, Dominions, Colonies, and Protectorates.

Australia—

Report of the Third Australian Cancer Conference held at Canberra, March 29th–31st, 1932. Canberra, 1932. 13¼″ × 8″, 40 pp.

Irish Free State—

Industry and Commerce, Department of. Census of production 1929. Reports 34. Electricity undertakings. 7 fols 35. Summary. 6 fols Dublin, 1932 13 × 8″.

(c) Foreign Countries.

Argentina—

Santa Fe. Direccion General de Estadistica. Censo de los desocupados existentes en la Provincia de Santa Fe entre el 10 y el 25 de Abril de 1932. Santa Fe, 1932. 10¼″ × 7″; 63 pp.

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Austria—

Bundesamt fur Statistik—

Gewerbliche Betriebszahlung in der Republik Österreich vom 14 Juni 1930 Salzburg. 48 pp. *Sch.* 6. Steirmark, 56 pp. *Sch.* 7. Tirol 53 pp. *Sch.* 6.50. Wien, 1932. 14¼″ × 10½″.

Landwirtschaftliche Betriebszahlung in der Republik Österreich vom 14 Juni 1930. Salzburg. 33 pp. *Sch.* 4. Wien. 21 pp. *Sch.* 2.50. Wien, 1932 14″ × 10½″.

Bulgaria—

Direction Générale de la Statistique. Résultats généraux du recensement de la population dans le Royaume de Bulgarie au 31 décembre 1926. Tome III. Statistique des professions. Sofia, 1932. 12½″ × 9″; 340 pp. 580 *Levas.*

France—

Statistique Générale de la France—

Indices généraux du mouvement économique en France de 1901 à 1931. Paris Imprimerie Nationale, 1932. 10½″ × 7″, 165 pp.

Résultats statistiques du recensement général de la population effectué le 7 mars 1926. Tome IV. Infirmites, habitations, ménages et logements. Paris Imprimerie Nationale, 1932. 10½″ × 8½″; 207 pp

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Die Wahl des Reichspräsidenten am 13 Marz und 10 April 1932. Berlin: Hobbing, 1932. 12″ × 8½″; 77 pp. *Rm.* 4.

Italy—

Istituto Centrale di Statistica. Annali di Statistica. Serie vi—

I. Costituzione e funzionamento dell' Istituto Centrale di Statistica. 294 pp. *L.* 25.

II. L'attività dell' Istituto Centrale di Statistica nel suo primo biennio di vita. 88 pp. *L.* 9.

III. *Livi, L.*—Computo della distribuzione degli emigrati e dei rimpatriati secondo l'età (sessennio 1920–25).—Sulle false dichiarazioni della data di nascita per i nati alla fine dell'anno e rettifica della distribuzione mensile delle nascite nel triennio 1923–25.—Valutazione del *deficit* demografico derivante dalla emigrazione e computo della popolazione successivamente all'ultimo censimento. 127 pp. *L.* 12.

IV. *Gini, C.*, & *Galvani, L.*—Di una applicazione del metodo rappresentativo all'ultimo censimento italiano della popolazione (1° dicembre 1921). 107 pp. *L.* 10.

V. Le caratteristiche delle zone agrarie del Regno. 199 pp. *L.* 20.

VI. Atti del Consiglio Superiore di Statistica.—Riassunti dei verbali delle sedute dal 1921 al 1925 e dal 1926 al 1927. 251 pp. *L.* 15.

VII. Atti del Consiglio Superiore di Statistica.—Sessione 1929. 229 pp. *L.* 15.

VIII. *Gini, C.*, & *Galvani, L.*—Tavole di mortalità della popolazione italiana. 412 pp. *L.* 30.

IX. Statistica della produzione bibliografica italiana nel 1928. 82 pp. *L.*6.

X. *Gini, C.*, & *de Finetti, B.*—Calcoli sullo sviluppo futuro della popolazione italiana. 130 pp. *L.* 12.

XI. Statistica dell' Istruzione elementare nell' anno scolastico 1926–27. 178 pp. *L.* 15.

XII. Statistica dell' Istruzione secondaria nell' anno scolastico 1926–27. 198 pp. *L.* 15.

XVI. Relazioni tra frazionamento della proprietá terriera ed alcuni fenomeni demografici. *d'Addario, R.*—L'agglomeramento della popolazione nei Compartimenti italiani. *Salvemini, T.*—Funzione interpolatrice della distribuzione dei centri secondo il numero degli abitanti. 142 pp. *L.* 12.

XVII. *Galvani, L.*—Calcolo delle probabilità di morte in generale e applicazione alla misura della mortalità infantile nella popolazione italiana dal 1873 in poi.—Alcune osservazioni sul VI Censimento generale della popolazione italiana (1° dicembre 1921).—154 pp. *L.* 12.

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XIX. *De Meo, G.*—Distribuzione della ricchezza e composizione demografica in alcune città dell' Italia Meridionale alla metà del secolo XVIII. 91 pp. *L.* 10.

XXI. *Di Comite, A.*—I Noli e la Bilancia dei Debiti e dei Crediti in Italia nel periodo (1925–28). 120 pp. *L.* 15.

XXII. Denominazione e numero dei comuni compresi nelle singole zone agrarie del Regno. 259 pp. *L.* 20.

XXIV. *De Castro, D.*—La statistica giudiziaria penale. 288 pp. *L.* 25.

XXV. Le denuncie ritardate di nascita nei Compartimenti italiani. 156 pp. *L.* 15.

XXVI. Atti del Consiglio Superiore di Statistica—Sessione ordinaria 9–10 gennaio 1931. 273 pp. *L.* 25.

XXVII. Atti del Consiglio Superiore di Statistica—Sessione ordinaria 22 dicembre 1921–X. 273 pp. *L.*25. [Rome. 10¼″ × 7¼″. 22 vols.]

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Commerce and Industry, Department of—

Japanese experience life tables 1912–27. Tokyo, 1932. 10¼″ × 7½″; xx + 270 + 54 pp.

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Det Statistiske Centralbyrå—

Folketellingen i Norge I desember 1930. Hefte I. Trossamfund (Hjemmehørende folkemengde). Oslo, 1932. 9½″ × 6¼″; 30 pp. *Kr.* 1.

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Les premiers résultats provisoires du recensement de la population du 9 décembre 1931. Warsaw, 1932. 10½″ × 8½″; 56 pp.

Analyse des résultats du recensement des logements du 30. ix. 1921. Warsaw, 1932. 13½″ × 9¾″; 84 pp.

Les régions de céréales en Pologne. Warsaw, 1932. 10½″ × 8¼″; 58 pp.

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Miscellaneous publication, 130. Feeding and management investigations at the United States Dairy Experiment Station at Beltsville, Md. 1930 report. 24 pp. 5 *c.*

Statistical bulletin, 37. Stumpage and log prices for the calendar year 1930. 59 pp. 15 *c.*

Technical bulletin, 279. Correlation of hereditary and other factors affecting growth in guinea-pigs. 35 pp. 10 *c.*

— 288. Farm mortgage credit. 101 pp. 20 *c.*

Children's Bureau—

Publication 210. Employment of mentally deficient boys and girls. 107 pp.

— 212. Juvenile court statistics. 69 pp. 10 *c.*

Labor Statistics, Bureau of—

Bulletin 543. Wholesale prices 1930. 103 pp. 20 *c.*

— 566. Union scales of wages and hours of labor, May 15, 1930. 238 pp. 15 *c.*

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(d) International.

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—— Transillumination and roentgenography of the maxillary sinuses a review Chicago Reprint from *Archives of Otolaryngology* December, 1931 10 6¾ 19 pp

Gledhill (*A H*) Private discussion on the Road Traffic Act, 1930 Costing statistics to be referred to by Councillor Gledhill in his address 1932 12 pp Standard costs and their influence on transport policy 1931 24 pp The transition in road passenger transport with special reference to the changes that have taken place between 1928–30 1930 31 pp 8 charts 9½ × 5½ 1 vol [Papers contributed to annual conferences of the Municipal Tramways and Transport Association 1930–32] (From the author)

Gumbel (*E J*) Das Zufallsgesetz des Sterbens Ergänzungshefte zum Deutschen Statistischen Zentralblatt Leipzig and Berlin Teubner, 1932 11¼ 8¼ 65 pp *Rm* 5

Harcourt Rivington (*Seward*) Mightier yet! being a critical commentary upon our industrial development post war taxation, national expenditure and Empire policy together with a constructive plan to re establish our economic independence London Simpkin Marshall 1932 9 5 136 pp 5s

Heilperin (*Michel A*) L'économiste et le monde contemporain Paris Sirey, 1932 7½ 4½ 37 pp

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Kohn (*Stanislas*) and *Meyendorff* (*Baron A F*) The cost of the war to Russia The vital statistics of European Russia during the World War by S *Kohn* Social cost of the War, by Baron A F *Meyendorff* New Haven Yale University Press (for the Carnegie Endowment for International Peace), London Oxford University Press, 1932 9½ 6½ xi + 219 pp 19s

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Meerwarth (*Rudolf*) *Günther* (*Adolf*) and *Zimmermann* (*Waldemar*) Die Einwirkung des Krieges auf Bevolkerungsbewegung Einkommen und Lebenshaltung in Deutschland Stuttgart Berlin Deutsche Verlags Anstalt (London Oxford University Press) 1932 9½ 6¼ 474 pp 25s

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Neyman (*J*) and *Pearson* (*E S*) On the problem of *k* samples Cracovie Reprint from *Bulletin de l'Académie Polonaise des Sciences et des Lettres*, 1931 9½ × 6¾ 22 pp

Oparin (*D I*) Das theoretische Schema der gleichmässig fortschreitenden Wirtschaft als Grundlage einer Analyse ökonomischer Entwicklungsprozesse Jena Reprint from *Weltwirtschaftliches Archiv*, October, 1930 9½ × 6½ , 70 pp

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ANNUAL LIST OF ADDITIONS TO THE LIBRARY

Since the issue of Part IV, 1931, the Society has received, by presentation or purchase, the periodical (official and other) publications enumerated below

(a) United Kingdom and its several Divisions

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Admiralty Health of the Navy 1930, Fleets, 1932 Navy Appropriation account, 1930 Navy, Dockyard expense accounts, 1929–30

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